THE IRON AGE

Published every Thursday Morning by David Williams Co., 14-16 Park Place, New York.

Vol. 83: No. 1. *New York, Thursday, January 7, 1909.* $5.00 a Year, including Postage. Single Copies, 15 Cents.

Reading Matter Contents	page	106
Alphabetical Index to Advertisers	"	372
Classified List of Advertisers	"	361
Advertising and Subscription Rates	"	138

REED F. BLAIR & CO.
FRICK BUILDING, PITTSBURG, PA.
STANDARD CONNELSVILLE
COKE
FOUNDRY FURNACE CRUSHED

The Original and only Genuine
STILLSON TRADE MARK REGISTERED
"STILLSON WRENCH"
is manufactured by
WALWORTH MFG. CO., Boston, U. S. A.
And bears their registered Trade-Mark

THE BRISTOL COMPANY
MANUFACTURERS OF
The Wm. H. Bristol Electric Pyrometers
For High Temperatures
THE BRISTOL CO.
Waterbury, Conn.

WE MAKE ALL KINDS OF BRAIDED CORD, INCLUDING SAMSON SPOT CORD
See Page 250
SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES

Cleveland City Forge and Iron Co. Cleveland, O.

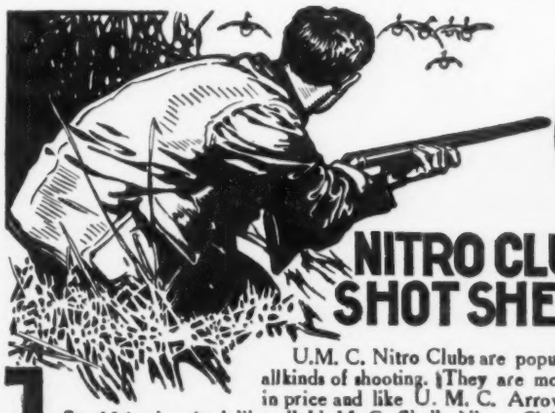
TURNBUCKLES

MERRILL BROS.
Maspeth,
New York, N. Y.

Low Phosphorous Pig.
Ewing & Crane
Real Estate Trust Building, Phila.
Chemney Bldg., Pittsbg. Empire Bldg., New York

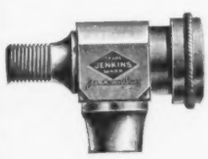
LUFKIN TAPES and RULES
MADE IN AMERICA and THE BEST IN THE WORLD
THE LUFKIN RULE CO., Saginaw, Mich., U.S.A.
New York London, Eng. Windsor, Can.

Apollo Special Electrical Sheets
Highest electrical efficiency sheets produced anywhere
AMERICAN SHEET AND TIN PLATE COMPANY
Frick Building, Pittsburgh, Pa.
See our ad on page 26


UMC
NITRO CLUB SHOT SHELLS
U.M. C. Nitro Clubs are popular for allkinds of shooting. They are moderate in price and like U. M. C. Arrows are Steel Lined. And like all U. M. C. Shells Nitro Clubs are made for every make and type of gun. That means that there is a demand for Nitro Clubs from all kinds of sportsmen for all kinds of hunting
Attractive Advertising for the Asking
The Union Metallic Cartridge Company
Bridgeport, Conn.
Agency 313 BROADWAY New York

WATER TUBE BOILERS The Babcock & Wilcox Co., 85 Liberty Street, New York
See page 72

Protection for "Capewell" Purchasers
Our rigid system of **inspection protects** every buyer of "Capewell" nails from paying for defective nails and pieces of scrap.
The most perfect nails manufactured anywhere in the world are shipped from our factory and are acknowledged by all who use them to be the **best driving** and **holding nails.**
For All Classes of Work the Best
MADE BY
The Capewell Horse Nail Company
Hartford, Conn.


Jenkins Automatic Air Valves
for steam radiators, heating coils, etc. Thousands are in use, and giving entire satisfaction. They are inexpensive, neat in design, and take up no more room than an ordinary air cock. Besides being very simple, they are most sensitive and durable.
Write for Catalog and Prices.
JENKINS BROS., New York, Boston, Philadelphia, Chicago

"Swedoh" Cold Rolled Steel is unexcelled for **Drawing and Stamping**
THE AMERICAN TUBE & STAMPING COMPANY
(Water and Rail Delivery) BRIDGEPORT, CONN.
SEE PAGE 37

MAGNOLIA ANTI FRICTION METAL
The Standard Babbitt of the World
We manufacture everything in the Babbitt Line.
MAGNOLIA METAL CO.

New York: 115 Bank St. Chicago: Fisher Building. Montreal: 31 St. Nicholas St.

All Valuable Characteristics

So much desired in Steel Sheets used in manufacturing electrical machinery are found in

FOLLANSBEE ELECTRICAL SHEETS

We are not presenting experimental material. Our sheets have been proven of superior quality in many important factories. To use them is to exercise economy and secure best results.

FOLLANSBEE BROTHERS COMPANY PITTSBURGH

BRASS { SHEET ROD WIRE

COPPER { SHEET ROD WIRE

GERMAN SILVER { SHEET ROD WIRE

LOW BRASS, SHEET BRONZE, SEAMLESS BRASS AND COPPER TUBING, BRAZED BRASS AND BRONZE TUBING : : : : :

Waterbury Brass Co.

WATERBURY, CONN.

99 John St., New York. Providence, R. I.

Bridgeport Deoxidized Bronze & Metal Co.

BRIDGEPORT, CONN.

Phosphor and Deoxidized Bronze

Composition, Yellow Brass and Aluminum Castings, large and small

---

Matthiessen & Hegeler Zinc Co.

La Salle, Illinois.

SMELTERS OF SPELTER

AND MANUFACTURERS

SHEET ZINC AND SULPHURIC ACID

Special Sizes of Zinc cut to order. Rolled Battery Plates.
Selected Plates for Etchers and Lithographers' use.
Selected Sheets for Paper and Card Makers' use.
Stove and Washboard Blanks.

ZINCS FOR LECLANCHE BATTERY.

GERMAN SILVER

In Sheet, Wire, Rods, Blanks and Shells

NICKEL ANODES

BRASS, BRONZE, COPPER in all forms

THE SEYMOUR MFG. CO., Seymour, Conn.

HENDRICKS BROTHERS

Manufacturers of

Sheet and Bar Copper, Copper Fire Box Plates and Staybolts, Wire and Braziers Rivets

Importers and Dealers in

Ingot Copper, Block, Tin, Spelter, Lead, Antimony, Bismuth, Nickel, etc.

49 CLIFF STREET - - NEW YORK

The Plume & Atwood Mfg. Co.

Manufacturers of

Sheet and Roll Brass, Wire, Rods, German Silver and Brass Goods in great variety.

Rolling Mill Thomaston, Conn. Factories Waterbury, Conn.

Branch Offices

New York Chicago St. Louis and San Francisco

ANTIMONY

"A. S. P." Brand (English Star)

C. W. Leavitt & Co., Agents

New York

SCOVILL MFG. CO.

Manufacturers of

BRASS, GERMAN SILVER, Sheets, Rolls, Wire, and Rods.

Brass Shells, Cups, Hinges, Buttons, Lamp Goods.

Special Brass Goods to Order.

Factories

WATERBURY, CONN.

Depots:

NEW YORK CHICAGO BOSTON

Henry Souther Engineering Co.

HARTFORD CONN.

Consulting Chemists, Metallurgists and Analysts.

Complete Physical Testing Laboratory.
Expert Testimony in Court and Patent Cases.

Arthur T. Rutter & Co.

256 Broadway, NEW YORK.

Small tubing in Brass, Copper, Steel, Aluminum, German Silver, &c. Sheet Brass, Copper and German Silver. Copper, Brass and German Silver Wire. Brazed and Seamless Brass and Copper Tube. Copper and Brass Rod.

"Search-Light" GAS Bicycle Lanterns

Send for Circulars and Electrotypes.

The BRIDGEPORT BRASS CO.
BRIDGEPORT, CONN.

Postal Telegraph Building, Broadway and Murray Street, NEW YORK.

PHOSPHOR-BRONZE
GERMAN SILVER

THE RIVERSIDE METAL CO.
RIVERSIDE, N. J.

THE IRON AGE

New York, Thursday, January 7, 1909.

The Greatest Steel Plant in the World.—I.

THE GARY WORKS OF THE INDIANA STEEL COMPANY, SUBSIDIARY OF THE UNITED STATES STEEL CORPORATION.

First of a Series of Articles Descriptive of a Plant Which Only an Aggregation of Colossal Resources Could Undertake.

(With Supplement.)

Since the organization of the Indiana Steel Company as a constituent interest of the United States Steel Corporation in January, 1906, and the subsequent announcement of its plans for the building of a steel plant of unprecedented size at Gary, Ind., this undertaking has commanded the interest and attention of the entire industrial world. Nor is this due alone to the magnificence of the scale upon which the work was planned; for it was easily recognized that an unprecedented opportunity would be here afforded for a concentration of the most modern methods and appliances for making steel from the ore to the finished product.

Projected under conditions unhampered by the limitations of capital and favored by the acquisition of an adequate site, it was expected—and with good reason—that the Gary plant when completed would represent in all of its units, individually and collectively, the acme of achievement in this branch of the world's industries. And as the plans have developed and taken form in construction, no doubt remains that these expectations are in the end to be realized in the fullest degree. The opportunity of designing a complete steel making plant of such size has never before presented itself to engineers; nor indeed can conditions better suited to successful accomplishment be easily conceived. The history of steel plant construction, in this and other countries, has been, generally speaking, one of evolution from more or less modest beginnings. First plans for such enterprises usually make only imperfect or inadequate provision for future growth and extension, with the result that there are lack-

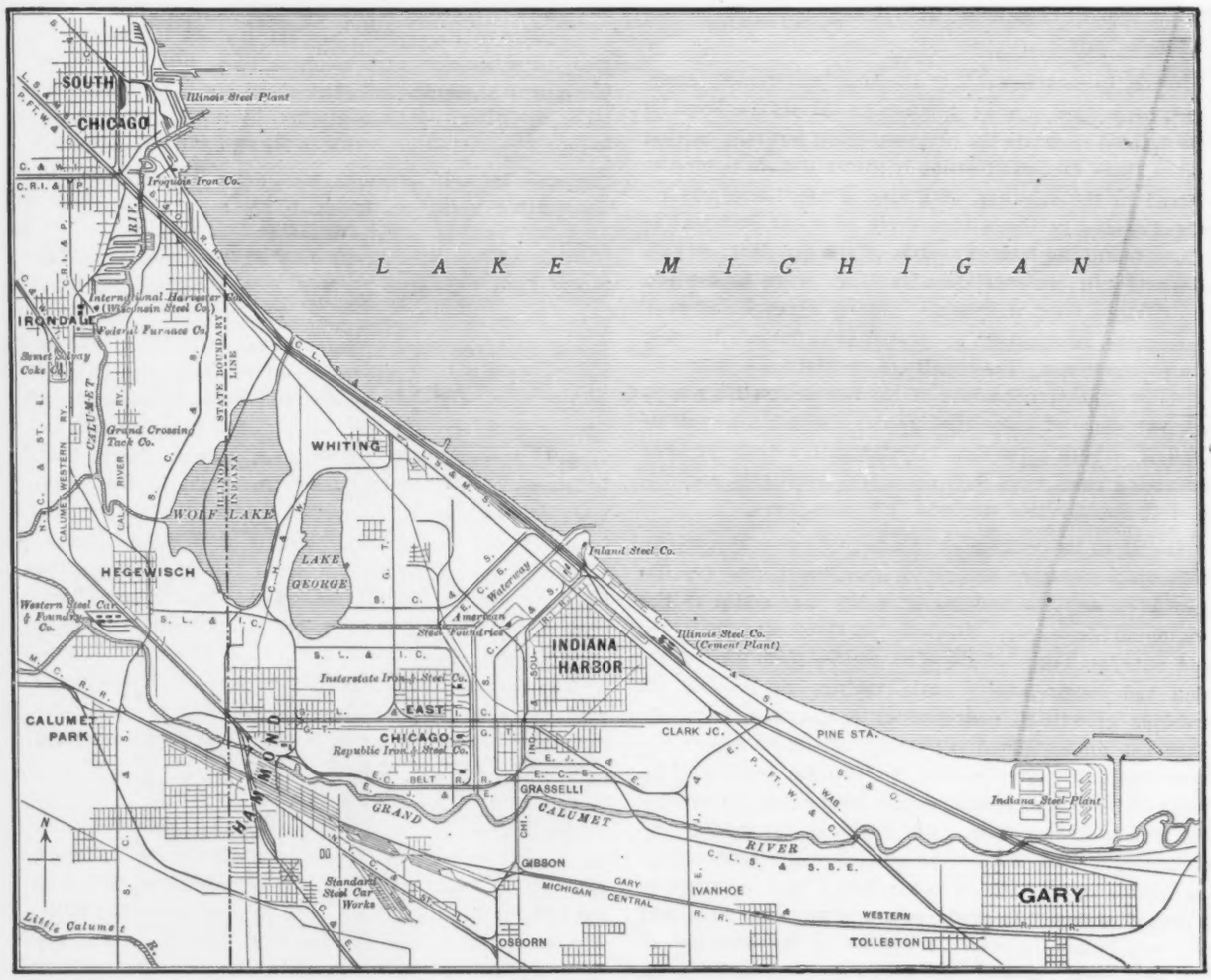


Fig. 1.—Map of the Calumet District, Comprising Portions of Indiana and Illinois, Showing the Location of the City of Gary and Its Railroad Connections.

ing the perfect symmetry and complete co-ordination of parts which are only possible when ultimate ends are in the view from the beginning. Here, however, is a great, well balanced plant, which will finally comprise a system of component units fitted together in a related plan calculated to facilitate, at every stage, the production of steel, and to secure the maximum of economy in the cost of producing it. A crowning feature of this plant is that the gas from the blast furnaces will all be utilized. A large percentage of it will be used in combustion gas engines for the generation of electric power. Except for various auxiliary purposes, and as a reserve in case the blast furnaces are shut down, steam will have no place in the mills of the great Gary plant. Fuel economy is a most important consideration in a plant located as this is. The coke for operating the blast furnaces must be brought from western Pennsylvania or West Virginia. Judge Elbert H. Gary, chairman of the United States Steel Corporation, in his testimony before the Ways and Means Committee in Washington, December 18, said: "The best Illinois coal is cokeable, but in the first place it is very high in sulphur which could be eliminated at a certain cost; but worse than that, the physical structure is such that it is not practicable. It will not carry the burden in the furnace."

When, in consideration of the large and rapidly growing consumption of steel products in the Middle West, it was decided to locate the proposed plant centrally in that region, three factors of prime importance were to be considered in the selection of a site: First, there was required a lake harbor with a depth of water sufficient to accommodate the largest vessels of the ore fleet; second, adequate rail transportation facilities were imperative, and finally a tract was needed of large acreage and moderate value, in one body, so located as to include the first two requirements. The conditions seemed to be fully met in the uninhabitated waste of sand dunes on the southernmost shore of Lake Michigan in the northern end of Indiana, where after due investigation a tract of land embracing more than 9000 acres was purchased and the work of construction started.

Owing to its remoteness from other habitable centers, it became necessary to provide dwelling places for the employees, and the building of a city was added to the original undertaking. The city of Gary was therefore laid out, just south of the steel works, upon an orderly plan and comprehensive scale, taking into account its probable growth to metropolitan proportions. Already Gary has an estimated population of 15,000 before the plant has fairly started, and is provided with an adequate water works system, whose permanent water supply will be drawn from Lake Michigan through a tunneled intake now under construction; an electric lighting plant, an electric street railway and a complete sewerage system. Its main street, paved with brick and concrete, has its northern terminus at the entrance of the steel plant, where the company's three-story brick administrative building and hospital buildings, yet to be erected, will face each other on either side of the street. The geographical position of the town and works with respect to Chicago and various adjacent industrial centers, together with main rail transportation lines and connecting links, is shown in Fig. 1, which comprises a map of what is known as the Calumet District. When first acquired by the Steel Corporation, two lines of road, the Baltimore & Ohio and the Chicago, Indiana & Southern, ran through the center of what is now the mill site. Over 40 miles of new railroad was built, and both the above roads were re-established by the corporation on rights of way passing between the town and the mills. The tracks at this point are elevated to allow an unobstructed entrance to the works.

The space required for an adequate description of these works, covering all of its branches, makes it impracticable to attempt to include it in a single issue. Some of the finishing mills, moveover, are yet in an incompleted state, with the details of construction not yet fully worked out, so that a comprehensive review of the plant as a whole is not at the present moment feasible. Work on the blast furnace end has been carried forward to an extent that includes the completion of four furnaces and the nearly finished erection of four others, which will comprise one-half of the installation plan. This installment of a series of articles on the great undertaking will, therefore be limted to a description of the blast furnaces, together with their auxiliary equipment, including the ore handling facilities, gas washers, blowing engines, &c.

Before examining these divisions in detail, a word may be said as to the general plant layout as outlined in Figs. 2 and 3. Therein lies a well wrought scheme of unification which is markedly characteristic of the entire plan. It embodies an adjustment of structural arrangement to the convenience of transportation rather than to alignment with compass lines, and constitutes not only a departure from precedent, but is productive of an unusual degree of flexibility in the interchange of traffic. The details of this design and its features of inter-relation and accruing advantage will be noted in the further sequence of this article.

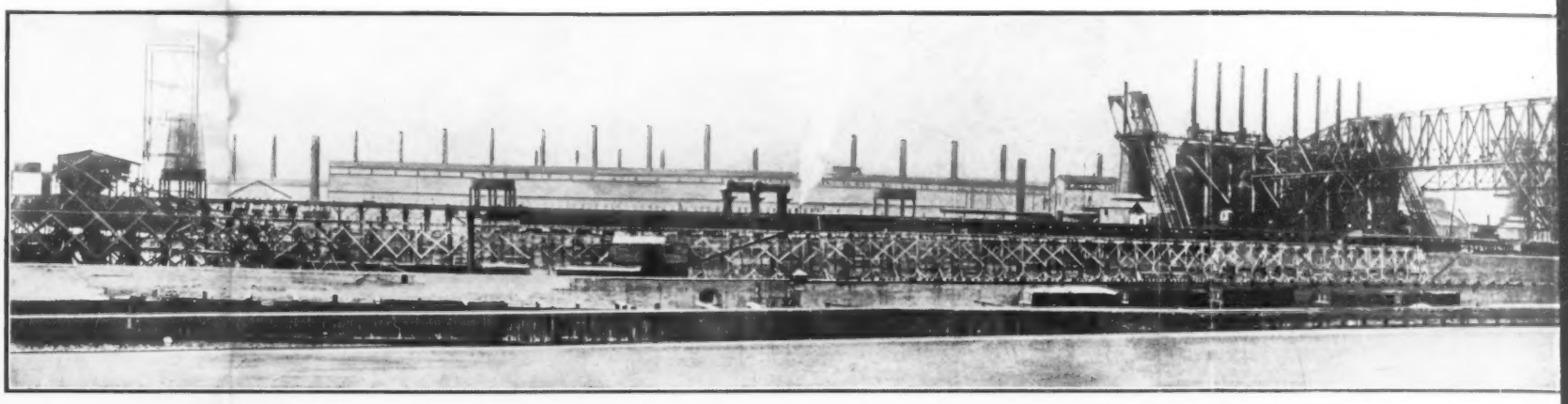
The Harbor.

The harbor line established at Gary by the War Department February 12, 1908, fixes the limit for lakeward filling at 25 ft. of water. This will carry the shore line 2000 ft. beyond its original location in 1906. Filling is done by means of sand suckers pumping from the bed of the lake, and is speedily and economically accomplished. Through the past season of lake navigation, beginning July 23, when the first cargo of ore in the hold of the steamer Elbert H. Gary entered the harbor, boats have entered the canal slip direct from the lake. There is now under construction, however, a filled crib breakwater, which, starting at a point 500 ft. west of the mouth of the slip, projects lakeward in half-crescent form 3200 ft. It is being built by the Great Lakes Dredge & Dock Company.

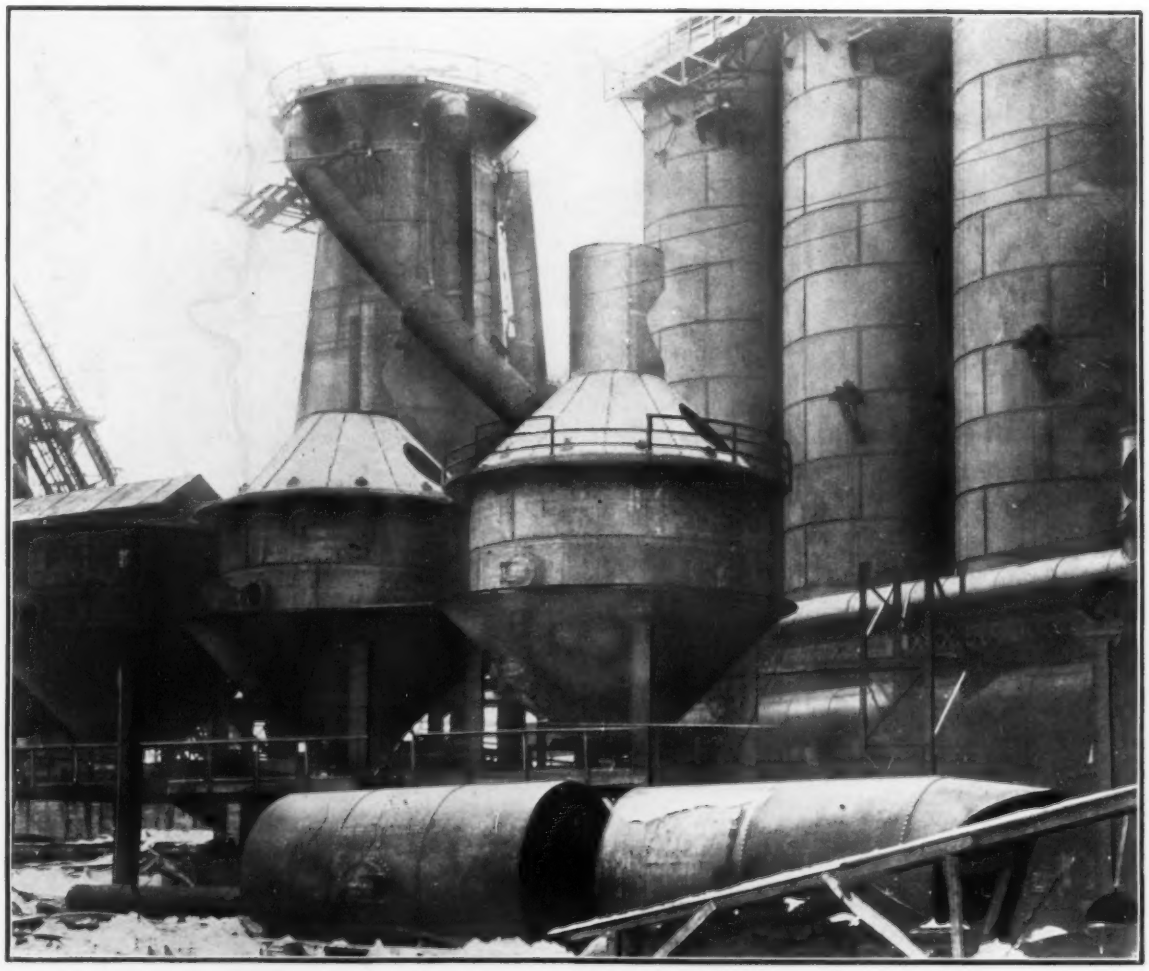
The accompanying pictorial supplement gives a panoramic view of the plant from the slip, together with the primary gas washers at one of the blast furnaces and a view under the ore bins.

The Ore Docks and Yards.

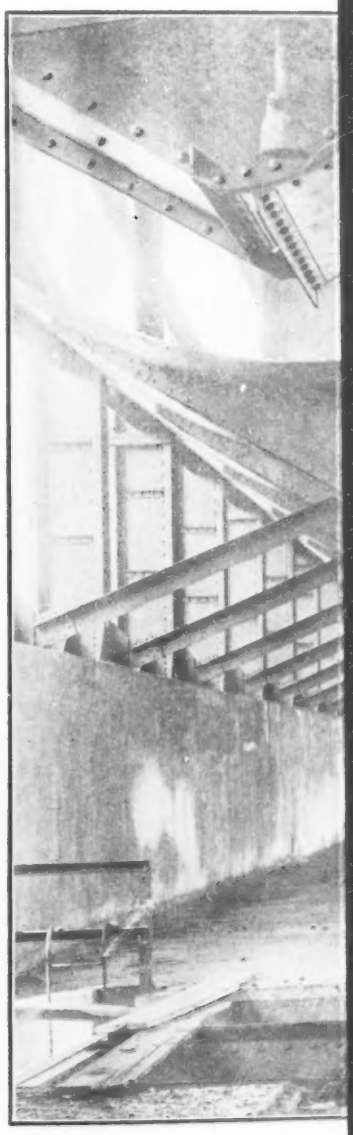
Starting at the docks where the ore is unloaded from the boats, the material passes uninterruptedly westward through the blast furnaces to the open hearths, thence to the billet mills and onward to the various finishing mills, without a return pass at any point. The dock and ore yards are located on a canal slip 250 ft. wide, with 22 ft. of water, extending inward from the lake a distance of 5000 ft. At the south end of this slip is a turning basin, having a free turning area of 750 ft. in diameter, where boats, after being unloaded, are headed about for their outward passage. To provide for the ore requirements of the furnaces during the winter months, when navigation is closed, a great ore yard storage capacity is required, and to guard against contingencies which might prevent replenishment of the supply for a prolonged period, plans have been made for the stocking of 2,500,000 tons, which, it is estimated, will keep the entire plant in normal operation for six months.



Panorama of the Slip, Harbor, Ore Unloaders and Blast Furnaces of the Indiana Steel Company, Subsidiary of

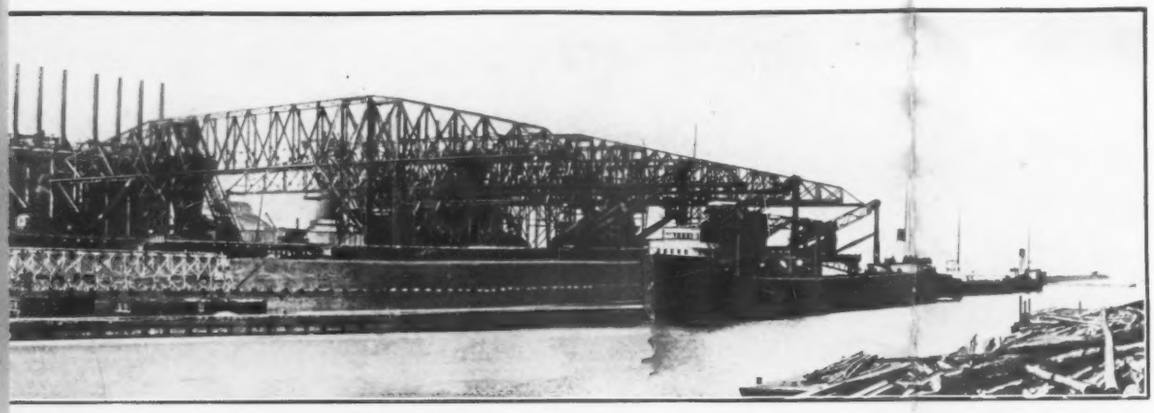


The Primary Washers of the Gas Cleansing System Installed by the Allis-Chalmers Company at the Blast Furnaces of the Indiana Steel Company.

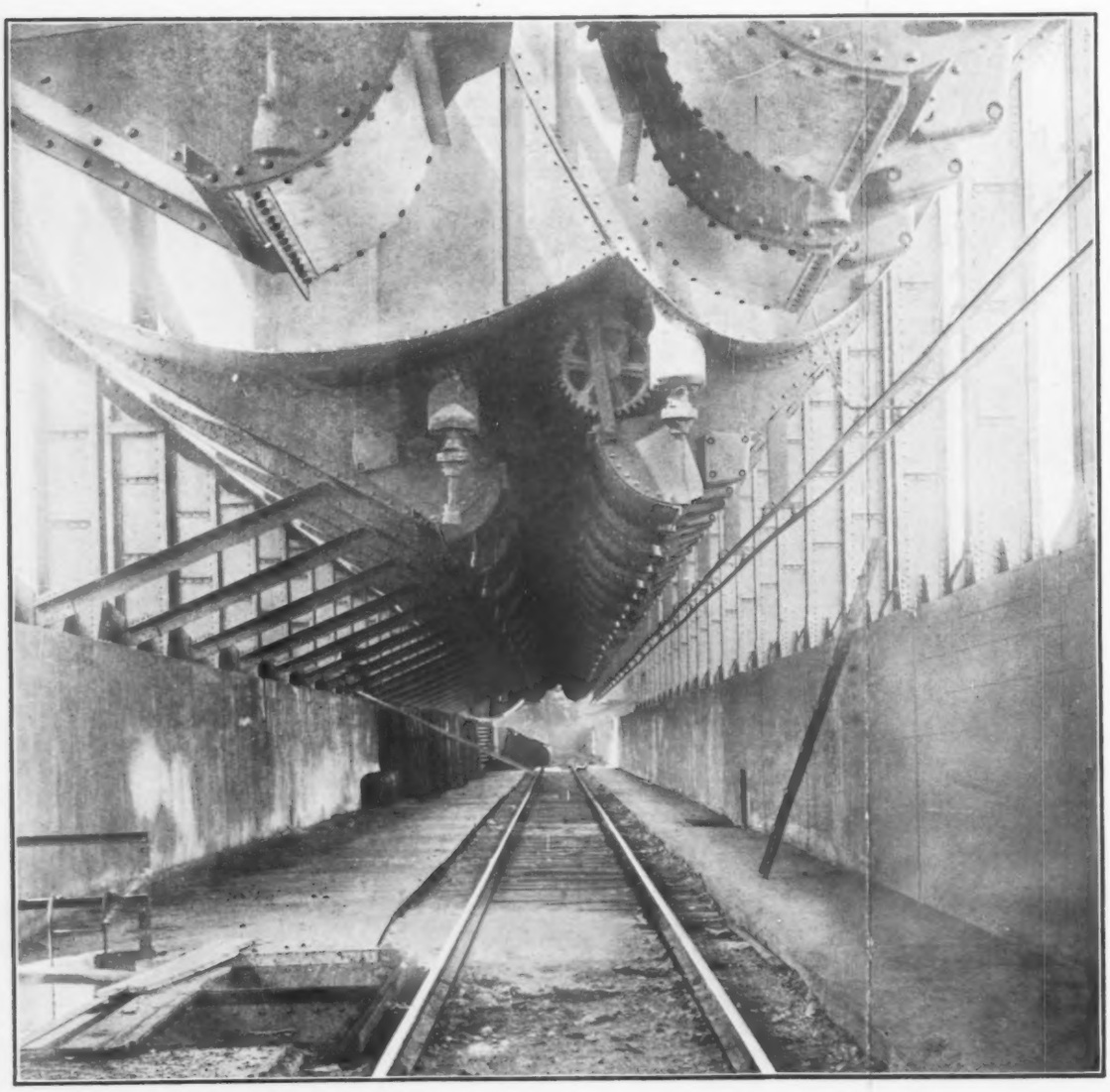


View

THE GREATEST STEEL PLANT IN THE W



ıa Steel Company, Subsidiary of the United States Steel Corporation.



View Under the Ore Bins at the Blast Furnaces of the
Indiana Steel Company.

LANT IN THE WORLD.

When the installation is completed the ore yards will extend along the front of the 16 furnaces, and will be approximately 4000 ft. in length. The yards are divided into three sections, by heavy longitudinal concrete walls, and are floored with concrete laid to a depth of 18 in. Between the ore yards proper and the unloader walls, which parallel the yards along the edge of the dock, is a space occupied by four ore shipping tracks, means being thus provided for the transfer of ore from the unloaders to the cars for rail shipment without rehandling. The central or main ore yard has a width of 187 ft. between retaining walls, and the east and west yards are each 100 ft. in width, with concrete division walls 26 ft. high.

THE HULETT UNLOADERS.

Ore is taken from the boats by Hulett unloaders of standard type, built by the Wellman-Seaver-Morgan Company, Cleveland, five of which are already installed, designed to serve eight furnaces; five more will be added when the remaining eight furnaces are completed. The unloaders are mounted on a concrete wall at the edge of the dock, along which they move laterally, being shifted to different points as occasion requires. Being lifted from the hold of the vessel by these machines, the ore is dumped from the clam shell buckets into a transfer car which transfers it to an ore trough built in the wall of the west ore yard. This trough has a capacity of 35 tons per lineal foot, and is constructed with an oval bottom, having a radius corresponding to that of the ore bridge clam shell buckets. Ore can also be dumped from these unloaders by means of the transfer car into weighing hoppers, and from these into cars on tracks below for rail shipment when desired.

HOOVER & MASON BRIDGES.

Five Hoover & Mason ore bridges, half the number contemplated in the completed plans, carry the ore from the yards to the ore bins. These bridges, which are of the usual type, are 495 ft. in length over all, with 130-ft. cantilevers on each end. They are elevated to an unusual hight in order to provide sufficient clearance over the unloaders to permit the free operation of the latter in any position, standing 84 ft. above the ore yard floor. The bridges are mounted on tracks traversing the two walls of the main ore yard and are adjusted for a skew of 17 degrees. Each bridge is equipped with a 15-ton clam shell bucket operated by a motor on the bridge. This system of handling ore is illustrated in Fig. 4.

ORE BINS.

Adjoining the ore yards on the side next the furnaces and paralleling them for their entire length are the ore, coke and limestone bins, half the number included in the finished plan being already installed. These bins are of the Brown parabolic type, and were designed and built by the Brown Hoisting Machinery Company, Cleveland, Ohio, together with the auxiliary apparatus for their operation, with the exception of the electric skip hoists, which were supplied by the Otis Elevator Company. The ore and limestone pockets are located on the ore yard side, material being dumped into them direct from the bridges or distributed along the line by means of 60-ton side dump transfer cars, which are mounted on a 6 ft. 3½ in. gauge track, extending along the top of the structure on the side next the ore yords. Three other car tracks of standard gauge traverse the top of the bins, and rail shipments of coke and limestone are dumped or unloaded into the pockets from the cars.

In its general arrangement and construction the bin storage layout is not different from the standard installations of this type. One feature of interest, however, has been introduced, the design of which is to facilitate the handling of coke, when by reason of cold weather or other causes the operation of the larries should be temporarily interrupted. Ordinarily material from the bins is transferred to the skip hoists by a system of electrically operated larries, but movement by this method is liable to temporary suspension at times in the winter through the freezing of the contents of the bins. To guard against such contingencies a special coke pocket of large size, fitted with steam pipes to prevent freezing, is provided for each furnace; it faces the skip incline, and is so arranged that coke may be fed from it direct to the skip car.

Aside from its convenience as an expedient for emergency use, as indicated, this special pocket finds favor for another reason. Naturally each handling of coke causes more or less crushing of the lumps, which is of course undesirable, and in taking it from the ordinary pockets by larries two handlings are necessary to put it in the skip car. But with the direct feed from the special pocket, one suffices to accomplish the same result. Each of these special pockets has a capacity for the storage of coke sufficient to supply a furnace for a run of 15 hr. The skip feed opening of these bins is under the direct control and in plain view of the skip hoist operator. The entire bin storage capacity for all material is ample for a run of all furnaces for 15 hr. without replenishment.

THE BLAST FURNACES AND STOVES.

Starting at the shore line of the lake—as it will be established when the projected work of filling in has been finished—and stretching southward in a direct line for ¾ mile are the 16 blast furnaces comprised in the plan shown in Fig. 3. Much of the filling required has already been done, as will be observed by reference to the plan view, since the original shore line ran through the site occupied by furnace No. 11, which, with No. 10, was the first to go in blast.

These blast furnaces are of standard design, but are of unusually heavy construction throughout; uniform in size, they are rated at a daily capacity of 450 tons. From the cross section view in Fig. 5 a clear idea of the general lines followed in their construction may be gained. As here indicated, the hight from center of iron notch to top platform is 88 ft. Starting at the bottom is the hearth, 15 ft. in diameter and 9 ft. in hight, above which the bosh rises 13 ft., tapering from 15 ft. at the bottom to 21 ft. 6 in. at the top line. Immediately above the bosh, at a point 8 ft. from the bosh zone, the stack tapers from 21 ft. 6 in. to 16 ft. in diameter at the top.

Furnaces Nos. 11 and 12 have been blown in, and Nos. 9 and 10 are practically ready for firing; Nos. 5, 6, 7 and 8 are under construction and will probably be completed in the spring of 1909. It is expected that work on the remaining eight furnaces will continue progressively without interruption until what is recognized as the greatest of modern achievement in this line will have been accomplished. While there is nothing of special interest marking notable departure from regular practice in the design and construction of the furnaces themselves, there are embodied in the general layout of the furnaces, gas handling equipment and trackage system features of convenience and mobility in handling of the product that challenge attention, both on account of their unusual character and completeness of detail.

The Trackage System.

The chief point of interest in this connection lies in the disposition of the cast houses with reference to the

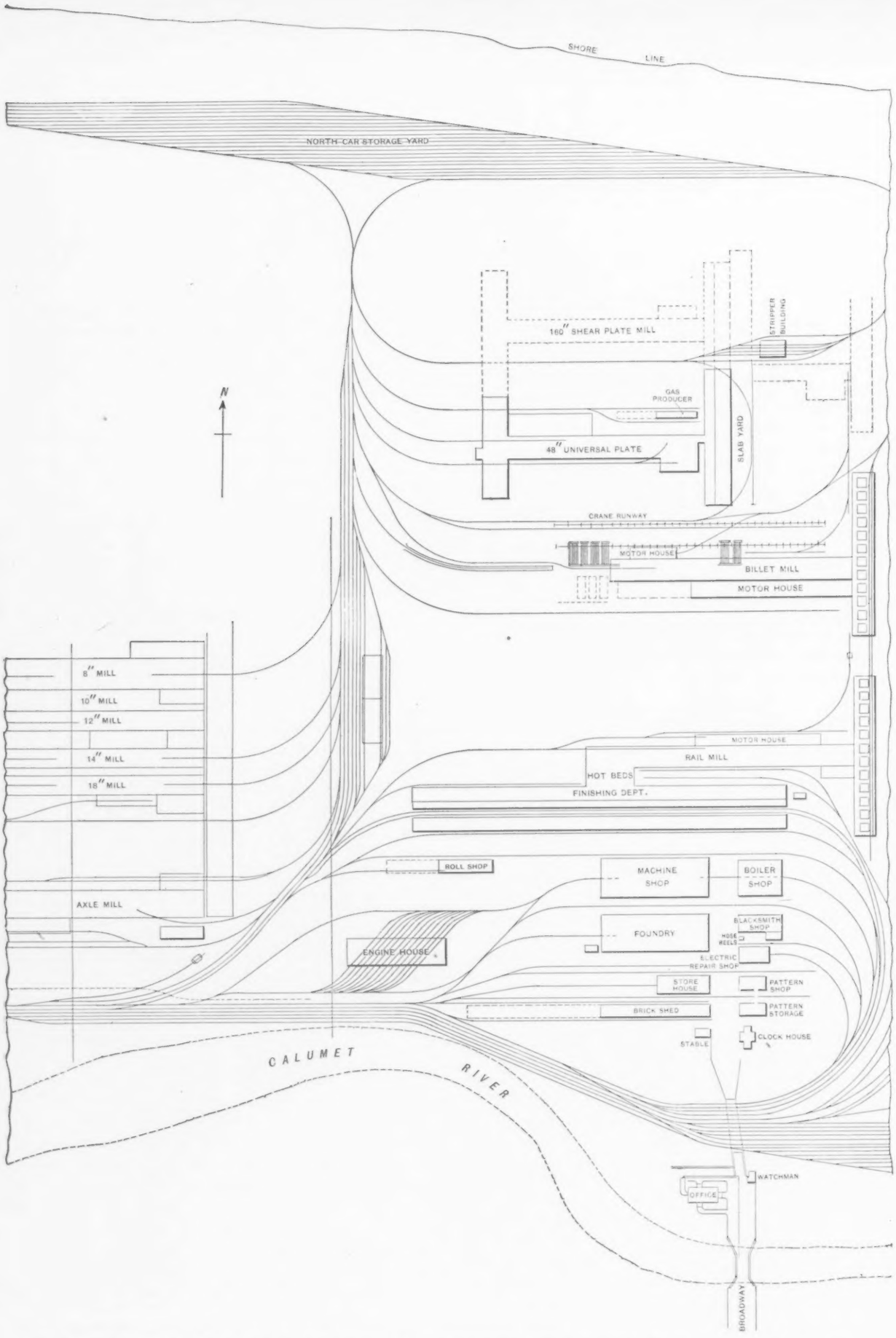


Fig. 2.—West Half of the General Plan of the Gary Works of the Indiana Steel Company. Continuous with the Plan Shown on the Opposite Page.

trackage system. In order to shorten the distance of travel for the products of the furnaces and secure the highest degree of compactness possible in this part of the plant, the common rectangular alignment of cast houses with the main tracks was discarded. In substitution therefor, as may be seen by reference to the general plan,

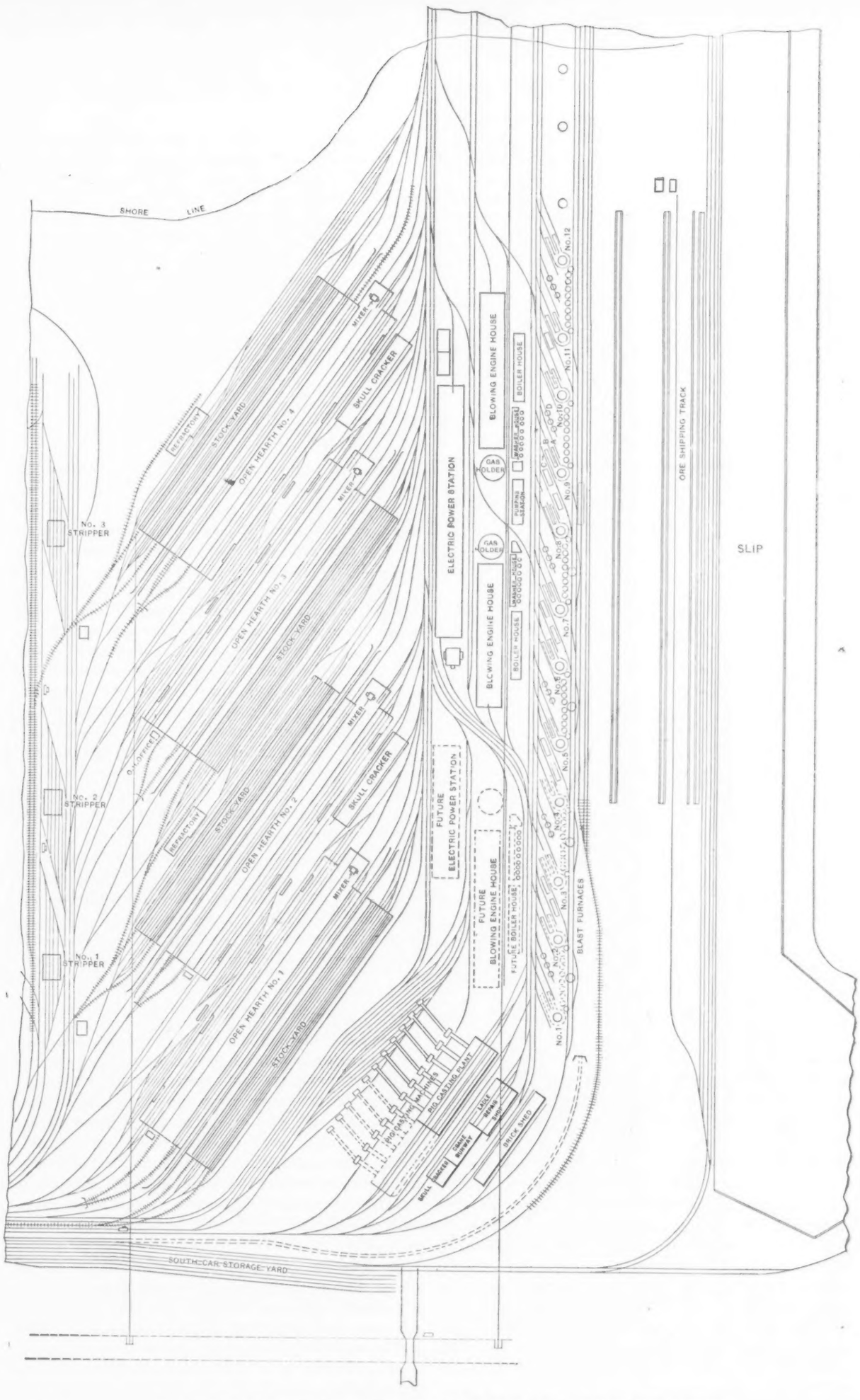


Fig. 3.—East Half of the General Plan of the Gary Works of the Indiana Steel Company.

Fig. 3, the scheme adopted places the cast houses at an angle of 22½ degrees from the parallel line of the furnaces and the three main line tracks by which they are served.

Branching from the two tracks nearest the furnaces at No. 9 stack, B is the principal hot metal track, while A is used both as an auxiliary hot metal track and for the loading of miscellaneous rubbish. Track C takes care of the cinders, which come either from the furnace direct or from a large concrete cinder tank. The spur D runs

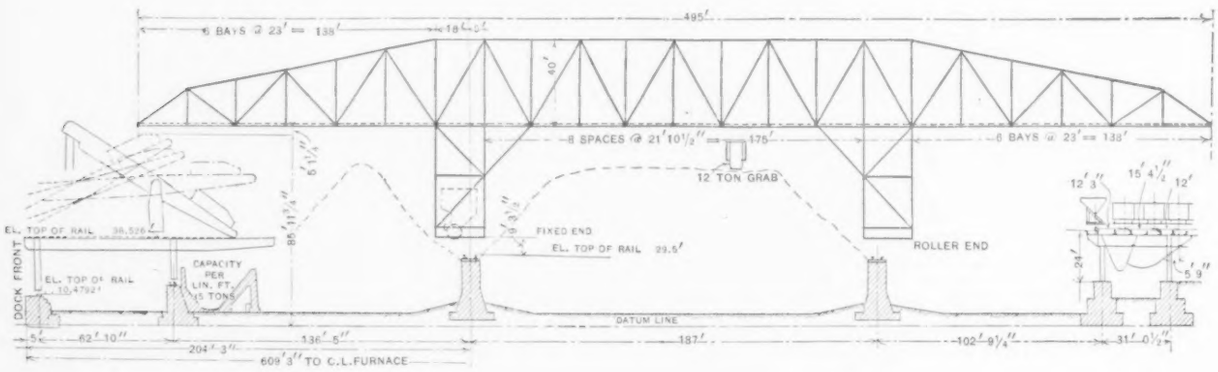


Fig. 4.—Arrangement of Ore Bridges and Dumps at the Gary Works.

are a series of ladder stub tracks giving access to the cast houses and primary washers. Three of these lead to the cast houses at each furnace, and one extends under each set of washers. Of the cast house stubs, as shown

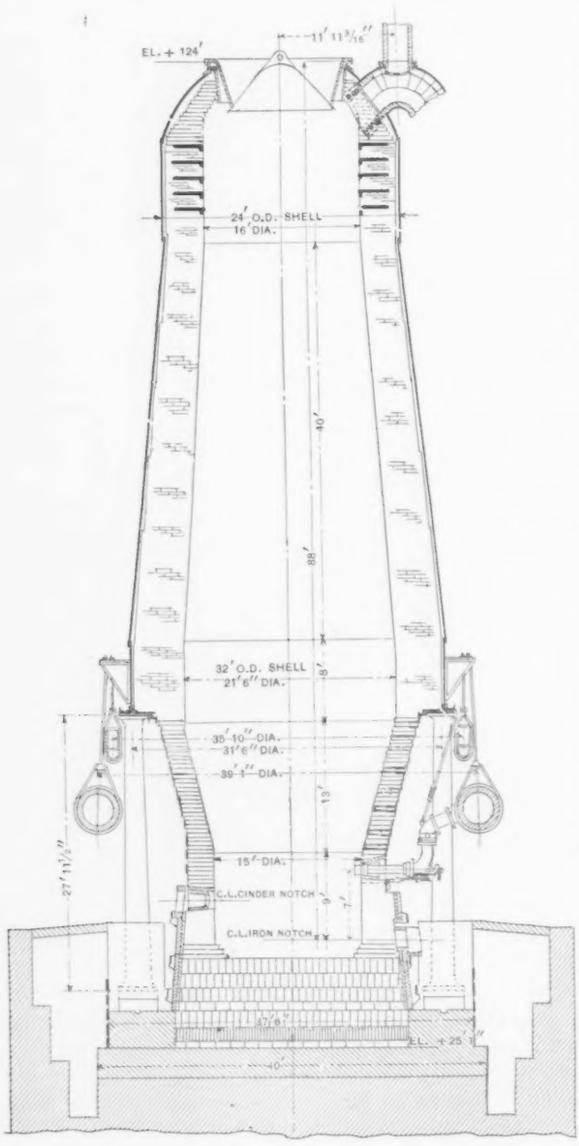


Fig. 5.—Cross Section of One of the Gary Blast Furnaces.

under the primary gas washers, from which the dust and dirt deposits are dropped through bottom openings into the cars. The main hot metal spur crosses over to the second or main line hot metal track. From this main line two crossovers lead out, one each at furnaces Nos. 7 and 11, respectively, and pass on to the open hearths.

With the three main blast furnace tracks and an additional line extending between these and the boiler houses there is wide freedom of movement both in and out, in the furnace zone, so that notwithstanding the heavy traffic that will be carried on when the full line of furnaces are in operation, there will be, under this admirable system, but little interference with the moving of hot metal and other material from the furnaces. The economy of space effected in the angular arrangement of the cast houses permits a closer grouping of the furnaces than would otherwise be possible, and at the same time affords ample room for the handling of casts and transferring hot metal to the open hearths.

The distance between the paired furnace units is 300 ft., the space between pairs being 220 ft. Each furnace is supplied with four Massick & Crookes three-pass firebrick stoves, the eight required for two furnaces being set in a parallel line between them. These stoves are 22 ft. in diameter by 95 ft. high and are of usual construction.

The Furnace Tops.

Although following in a general way the latest accepted practice in design and construction, some changes worthy of note have been introduced in the furnace charging tops. This is especially true of the Baker & Neumann distributers, with which they are equipped. When this style of distributer was first installed at the Joliet Works it was mounted on the upper bell, and was actuated by the raising and lowering of the bell rod through a series of bevel gears and a pawl and ratchet. Later modifications led to improvements, the latest of which are represented in the Gary installation.

As now built the distributer is a half funnel shaped casting, incased in a cast steel hopper immediately beneath the receiving hopper. It is driven from the upper skip hoist shaft by a crank and rod mechanism, the details of which are shown in Fig. 6. The actuating motion is communicated by a pawl engaging a ratchet on the rim flange of the distributer. Each trip of the skip car

gives the distributer about 3 degrees more than a quarter turn, so that in four trips of the car it moves 12 degrees beyond a full revolution. Thus instead of depositing the charge in the same quadrant at each successive turn it keeps shifting forward and so evens the distribution.

An ingenious but simple electrical device has been substituted for the earlier cumbersome and complicated mechanism by which the changing position of the distributer was indicated on a dial in the operating room. This consists of four electric contacts on the rim of the distributer, which continue through a part of each quadrant; these are wired to four incandescent lamps at points numbered to correspond to the quadrants to which they are connected, which as they light successively and automatically indicate to the operator the location of the distributer. If unevenness develops in the stock chamber the skip car can be run empty one or more trips, until the distributer is in position to deliver the charge at the desired point.

In choosing a motive power and equipment for operating the furnace bells steam was of course not considered, though the use of an electrical winch was entertained; but because of excellent results obtained from a similar installation at the South Works of the Illinois Steel Company it was finally decided to employ air cylinders with pistons operated by air pipes from the cold blast main. For this purpose two vertical cylinders, one for the large bell 40 in. in diameter with 5-ft. stroke, and the other for the small bell 21 in. in diameter and 47-in. stroke, are located together with the skip hoist motor in an elevated structure underneath the skip incline. The pistons are connected to levers, the arrangement of which is shown in Fig. 6, by which the bells are raised and lowered, their movement being controlled by a four-way valve on each cylinder. These valves are opened and closed by cords leading to the operating room. The stock gauge is also located in this room, the rods being handled by a geared hand crank. All of the furnace operations are therefore concentrated in the hands of one man.

The arrangement of the skips for carrying the charges of ore, coke and limestone from the bins to the furnace tops is shown in Fig. 7.

Dust Catchers and Gas Washers.

Because of the adoption of furnace gas engines as the principal means of generating power, the complete elimination of ore dust and other impurities from the gas became an imperative requirement, since the satis-

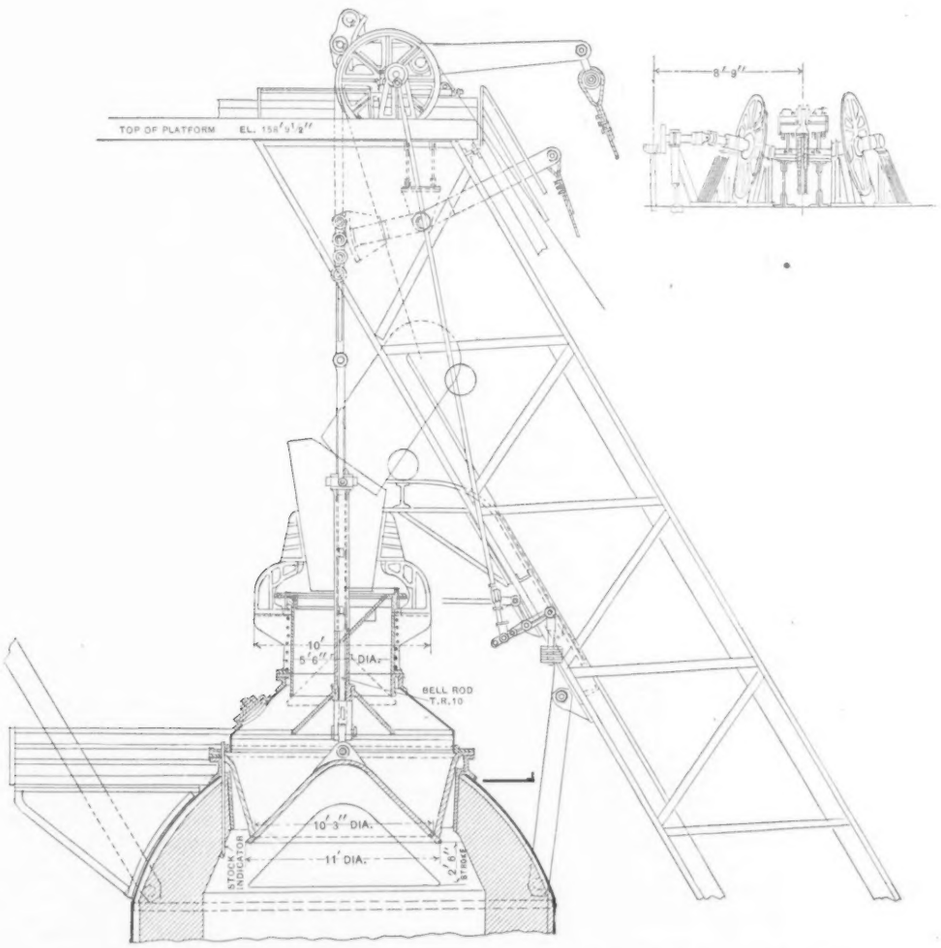


Fig. 6.—The Top of a Gary Blast Furnace, Showing the Baker & Neumann Distributer.

factory operation of the gas engines in this manner depends chiefly upon the purity of gas. No pains, therefore, have been spared in making the purifying as effective as possible, with the result that there has been constructed one of the most complete, as well as the largest, gas washing plant ever installed. The arrangement of the piping is shown in Fig. 8.

Passing from the top of the furnace, the gas is discharged through four outlets feeding into two downcomers, by which it is carried to a first or main dust catcher; this is a cylindrical tank 25 ft. in diameter by 45 ft. high, with conical top and bottom, and is set close in to the furnace and the first stove on the side next to the ore yards; thence it passes to a second or auxiliary dust catcher of the same general type, 18 ft. 6 in. in diameter by 30 ft. high. This tank serves the double purpose of a dust receptacle and water valve. When used in the latter capacity it is filled with water high enough

to submerge the mouth of the inlet pipe from its corresponding furnace to protect it from back flow of the gas when shut down for repairs or other cause. Since the two furnaces working in pairs, with identical equipment, discharge into a centrally located common gas main leading to the primary washers, the necessity for this arrangement is obvious.

The system of dust catchers above indicated applies to furnaces Nos. 9 to 12, inclusive, which are now completed, but in furnaces Nos. 5 to 8, inclusive, now under construction, the process of dry dust elimination is carried a step further. Under the latter plan the gas, instead of passing direct from the secondary catchers into the common central pipe, will at this point enter a tank 40 ft. in diameter by 25 ft. high, and from there pass into the gas main. The advantage gained in this construction is that, by means of the large area provided in this tank, the velocity of the gas will be checked and thus allow more of the dust to settle to the bottom. For convenience in cleaning all of the dry dust catchers are supplied with bell bottoms, which discharge direct into cars on the track running underneath. The flow of gas from either furnace may be shut off as described, preventing back flow of gas from mains beyond.

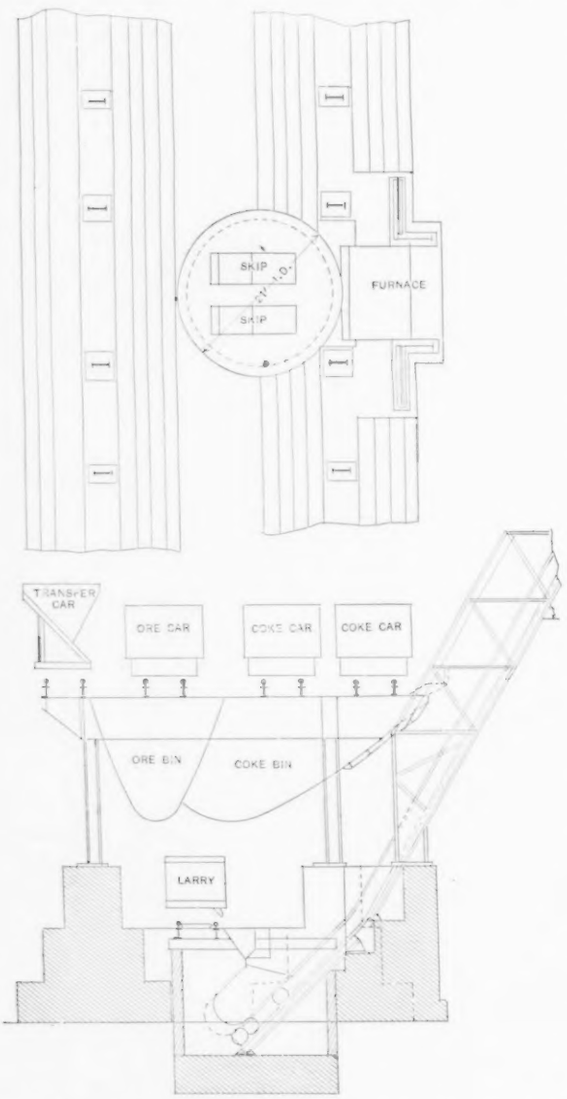


Fig. 7.—Skip, Pit and Bin Arrangement at the Blast Furnaces of the Gary Works.

Having moved all of the impurities possible by dry precipitation, the gas is conducted through a main pipe into the primary washers. There are three of these to each pair of furnaces, each having a capacity sufficient to take care of the gas from a single furnace, so that one is always available for cleaning or repairs. These washers are cylindrical in form, 22 ft. in diameter by 40 ft. high, including the gas inlet, with cone tops and bottoms, and are filled with water to about one-third their hight, which level is maintained by proper overflows entering at the top.

The gas and dust are carried downward through a central pipe which terminates near the water level in a fluted mouth designed to spread the gas at its contact with the water over the greatest possible area. Flowing upward from around these fluted edges, the gas passes out through two openings, one on each side of the washer, entering a dust leg, whence it passes onward to the main, supplying stoves, boilers and the secondard gas washing plant. It is at this point that gas for firing special furnaces under the steam boiler batteries and stoves is diverted, about 7½ per cent. of the entire volume being used for steam generation, 30 per cent. being taken for heating the stoves; the remainder goes on to a set of washers for further treatment. Comprised in this group are eight Zschocke washers, which serve four furnaces. They differ from the older type of construction in that the entire system of baffle plates and checker work is combined in one vessel instead of two; the checker work in this instance is superimposed upon the baffle plates, the whole forming a vertical drum 60 ft. in hight. Through mains leading from the primary washers, in which dust pockets are located at intervals, the gas is introduced at the bottom of this secondary set, and rises in a zigzag course through the baffle plate, which extends about half way up the structure; there it enters the checker work chamber, where it encounters a shower of water falling from above through checkered openings, which washes out most of the remaining dust and other impurities. The water is jetted in at the top through a series of Schutte & Koerting spray nozzles.

The final cleansing process is performed by what is known as Theissen washers, one of which is connected to each of the Zschocke units. From the top of the latter gas is conducted to the Theissen washers, which are so connected that both may be shut off simultaneously. A detailed description of this apparatus was printed in *The Iron Age* September 6, 1906. Briefly, the Theissen washer consists of a cast iron cylinder inclosing a revolving drum carrying a series of paddles and blades on its outer circumference. Driven by a 150-hp. motor, this cylinder revolves at the rate of 350 rev. per min., spreading a film of water against the inside surface of the cylinder, which gathers from the impinging gas such impurities as it still contains. These machines, which are designated as No. 4 A, have capacity for handling 14,000 cu. ft. of gas per minute, and were furnished by the Kilby Mfg. Company, Cleveland, Ohio.

The cleansing process being completed the gas, after passing through a water separator, is conducted under slight pressure to holders 90 ft. in diameter by 30 ft. high, with a capacity for 350,000 cu. ft. from its distribution to the electric power stations and blowing engine houses, which consume about 57½ per cent of the total gas product. When the 16 blast furnaces are completed and in operation this will amount to about 44,900 cu. ft. of gas per 24 hr.

The distribution of the furnace gas and the relative quality provided for the various purposes for which it is utilized are shown in the diagram, Fig. 9.

Safeguards.

Great care has been taken to provide safe and easy access to all parts of each individual structure compris-

ing the various furnace units at points required to be reached for the purpose of cleaning or making repairs. Railroad iron platforms, galleries and stairs furnish a secure footing for the men wherever there is likelihood of their being called in the performance of their duties. The provisions of this character are unusually complete, and have been worked out with special reference to safety in the conduct of general operations.

Concrete Cinder Tanks.

As an instance of the compact and convenient grouping of related units, a striking illustration is offered in the arrangement of the cinder tanks. Each of these is large enough to take care of two furnaces, between pairs of which they are set parallel with the cast houses. They are built of reinforced concrete and are 154 ft. by 17 ft. on top, tapering to a 12-ft. oval bottom, with a depth of 22 ft. 6 in.; they project 14 ft. above ground. It was

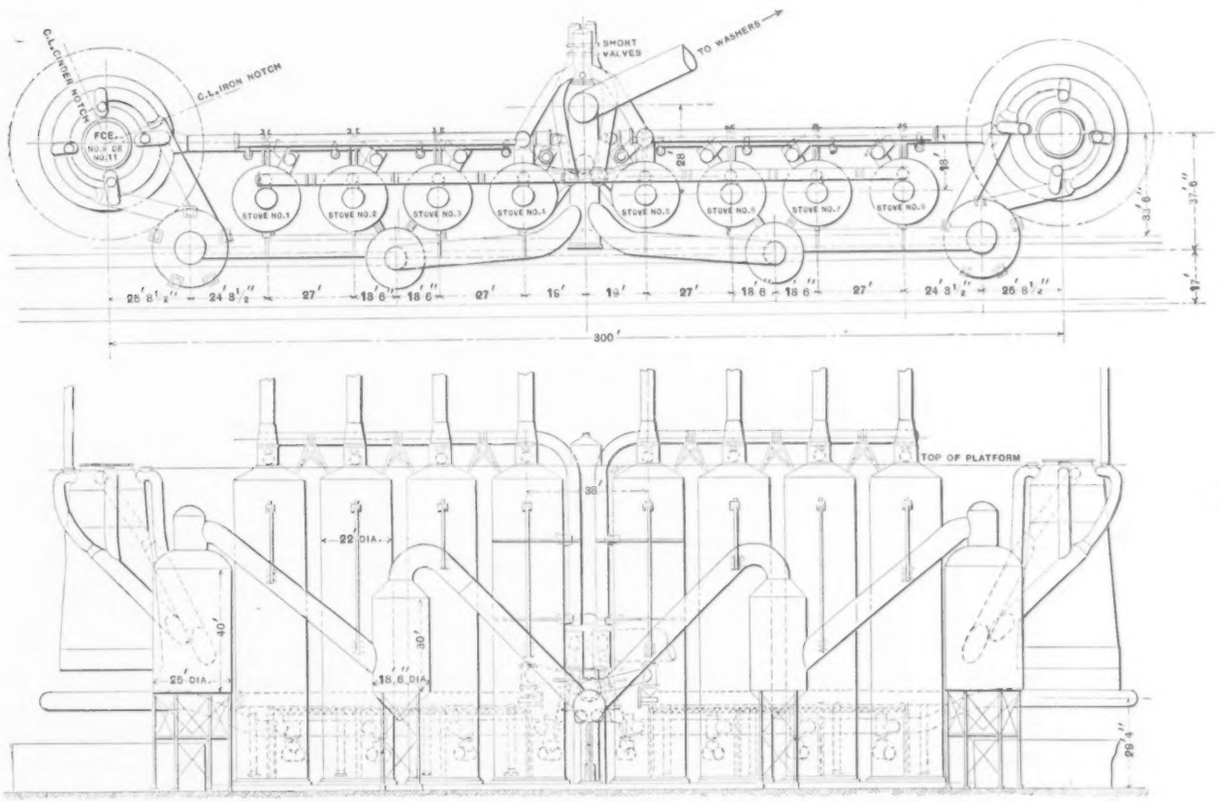


Fig. 8.—The Arrangement of Gas and Air Pipes at a Pair of Blast Furnaces at the Gary Works.

of course desired to provide facilities for running cinders either into cars or into the cinder tanks. Their position enables this to be conveniently done from one cinder notch in the even numbered furnaces, while, to secure the same result, two cinder notches placed opposite each other are provided for the odd numbered furnaces. One of these leads to the cinder tank and the other empties into the cinder run on the cinder track side.

Pig Casting Machines, Cast House.

At the southeast corner of the site is located the pig casting plant, including cast house, pig casting machines, ladle repair shop, scrap yard, skull cracker and storehouse for brick. In none of the other furnace adjuncts is the general scheme of layout and perfection of detail carried out to fuller extent or with better results than are shown in this most interesting installation.

Notwithstanding the large area of the site at the disposal of the designers, the extraordinary size of the plant required to take care of the product of 16 furnaces made an economical and compact arrangement of its constituent units an imperative necessity. The chief problem in this connection lay in the disposition of the terminals of the pig casting machine conveyors, and its successful solution may be followed out by an examination of the general plan, Fig. 3. Situated at the extreme south end of the furnace line, the main hot metal tracks continue on in an almost parallel course into the cast house, which is supplied with three ladle tracks. This is a steel structure, 82 x 700 ft., planned to accommodate 11 pig casting machines. The six now installed were built by Heyl & Patterson, Inc., Pittsburgh, and they represent in general the standard type of machines produced by this firm. Hot metal is transferred from the furnaces in 40-ton ladles to the cast house, where they are lifted from tracks to pouring cradles by 75-ton Alliance Machine Company electric traveling cranes, of which there are two spanning the floor.

Particular interest attaches to the pouring cradles because of features of improvement worked out and introduced by the steel company's engineers with a view to minimizing the waste and danger to handlers attendant upon pouring molten metal. The cradle consists of a heavy cast steel frame, having two arms upon which the ladle is firmly supported. These arms are trunnioned on heavy steel supports on the side next the pouring pot, so that, when raised, the bottom of the ladle describes a wide arc, while its pouring lip, being near the rotating axis, moves very little. Instead of dropping from a hight, which at the start usually closely approximates that of the ladle itself, the mouth in this case remains practically stationary at a distance of about 18 in. from the pouring pot. Naturally very little splashing of metal results from this method, and casualties from this source are greatly reduced. Raising and lowering of the cradle are performed by a specially designed stationary jib crane, one being provided for each cradle. They are constructed of lattice box girder masts and jibs, with top and bottom ball bearings, and have a lifting capacity of 30 tons, which, with the leverage afforded by the cradle arms, is ample to handle the 40-ton ladles.

These cranes were also furnished by Heyl & Patterson, Inc.

On the side of the cast house, opposite the machines, is a 14-ft. ladle cleaning wharf, from which the scale and cinder are loaded into cars on a track paralleling the building on the outside. In the angular alignment of the pig casting machine cooling and loading conveyor terminals are provided, this being a model arrangement for the avoidance of traffic congestion in handling the product. By a well adapted system of ladder tracks cars can be loaded at any one or all of the terminals without interference and shifted forward on a gravity grade of 1¼ per cent. toward the main east and west yard lines. Without sacrificing anything in the mobility, the whole loading system, considering its magnitude, has been compressed into a remarkably small space, and at the same time profits in the advantage derived from lessened travel.

Just east of the cast house are the ladle repair shops, scrap yard and skull cracker, the three structures succeeding each other in order. The ladle repair shop, a steel structure, 75 x 200 ft., contains three tracks, four relining pits and six ladle dryers, which are served by an Alliance Machine Company 50-ton electric crane of 75 ft. span. The ladle drying equipment is unusually complete. Telescoping gas burners project vertically from an overhead connection to a gas main into the ladles and can be adjusted to concentrate the heat at any point of the interior of a ladle. This movement, together with the raising and lowering of the bell cover, is conveniently controlled by a counterbalanced lever mechanism. Gas is supplied by a small gas producer located in the building at the end of the line of dryers. Upon completion of the full line of furnaces it is expected that furnace gas will be used for the dryers, since furnace No. 1, when erected as planned, will be near enough to afford a convenient source of supply.

In a leanto on the east side of the ladle repair shop are a clay storage and mixing room and a tool and general repair shop. The ladle repair shop opens into the scrap yard, which, with the skull cracker just beyond, is served by electric cranes on a common runway 32 ft. above the floor line, that extends through all three structures. A standard gauge track entering the skull cracker at the outer end runs on into the scrap yard, so that all loading in both sections is expeditiously handled by the overhead cranes.

The skull cracker is a steel skeleton structure 80 ft. wide by 100 ft. long and 70 ft. high. Ten feet from the top it is spanned by a cracker crane of 40 tons capacity, providing a sheer drop, for the weight, of 60 ft. to the ground level. A large pit deeply lined with strongly reinforced concrete has been sunken in the floor to receive the skulls, which are carried over from the crane on the lower runway. Here, as elsewhere throughout the plant, lifting magnets play an important part in the work of handling material. Both the drop and the skulls will be picked up and transferred by magnets, which will form part of the equipment in these departments. The magnets here used were supplied by the Cutler-Hammer Mfg. Company, Milwaukee, Wis.

When the finishing mills are running full, in proportions to the furnaces in blast, the open hearths will be fed direct from the blast furnaces, and under ordinary conditions there will be but little pig iron cast, except on Sundays, holidays and other occasions when the mills are shut down.

The Blowing Engines.

In a line parallel with the boiler houses and gas scrubbers, just west of the blast furnaces, are the blowing engine houses. They are of brick and concrete construction, 104 ft. wide, one being 600 ft. and the other 500 ft. in length. Each of these houses contains 10 blowing engines, in addition to which there is included in the longer building a central pumping and hydraulic power plant. Of the 20 blowing units 16 are horizontal twin tandem gas engines, two in each house being Tod steam driven blowing engines.

The gas engines have gas cylinders 42 in. by 54 in. stroke, with two direct driven 72-in. blowing tubs, capable of delivering 30,000 cu. ft. of free air per minute against a pressure of 18 lb. per square inch, and are so designed that they can be operated at any pressure up to 30 lb. These tubs are of the Slick type, the characteristic feature of which is that the tubs or cylinders themselves constitute the air inlet valves, which are so constructed that an inlet area of 25 per cent. or more is easily attainable, thus insuring the complete filling of the cylinders at the maximum speed of the engines, which are normally operated at 75 rev. per min. The patents covering the Slick tubs are controlled in this country by the Allis-Chalmers Company. The gas and air cylinders are located at the opposite ends of the engine frame. Eight of these engines were built by the Westinghouse Machine Company and eight by the Allis-Chalmers Company. Each engine is rated at 25 hp.

Instead of the usual ignition mechanism applied to the Westinghouse engines, a new system devised by the steel company's engineers has been adopted. It includes the use of two 5-kw. motor generator sets, with a voltage ranging from 80 to 110 volts. It is so arranged as to give independent control of each engine, and is equipped with a safety device, by which in case of trouble any engine is automatically cut out. The air starting pressure is supplied by an independent compressor set electrically driven, and instead of separate storage tanks for each engine air is piped to each one under 200 lb. pressure from an extra heavy 30 in. main, laid under the floor the full length of the house.

The Tod steam blowing engines have cylinders 44

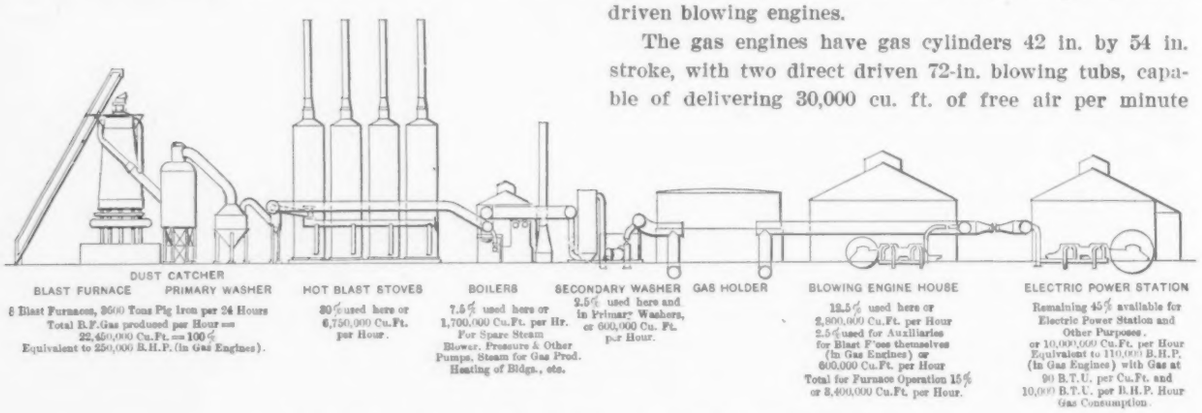


Fig. 9.—The Distribution of the Furnace Gas at the Gary Works.

by 84 in. and 72-in. stroke, with 90-in. air cylinders, and running at 40 rev. per min. under 150 lb. pressure and 26 in. vacuum, will deliver a maximum of 40,000 cu. ft. of free air per minute. Three cross compound Snow pumping engines comprise the principal equipment in the hydraulic plant, which serves all the works. These pumps, which are supplied with Worthington condensers, have a rated maximum capacity of 1900 gal. per minute, with 150 lb. of steam, against a total water pressure of 500 lb. Water is taken from the canal slip through a 20-in. pipe. The blowing engine houses are each served by two 50-ton Morgan electric cranes, commanding the entire building.

The Storage of Coke, Coal and Limestone.

Extensive yards for the storage of coke, coal and limestone have been laid out at a point on the lake shore, about 3 miles west of the mill site proper, at Stockton Station. The site covered by these yards comprises part of the large tract of land included in what is known as the Gary properties, owned by the United States Steel Corporation. The facilities provided for the storage of these materials will be shared jointly by the Illinois Steel Company, and will be the most extensive of their kind in the West. Loading and unloading will be done by mechanical appliances of the most modern type. The unloaders in use are of an improved revolving conveyor type, having a capacity each of about 50 cars for a 9-hr. day. They were built by the Hamilton Mfg. Company, Columbus, Ohio.

(To be continued.)

Sault Canal Traffic in 1908.

The report of L. C. Sabin, general superintendent of St. Mary's Falls Canal, Michigan, makes the following exhibit for the United States and Canadian canals for the season of 1908. The United States canal was open from April 27 to December 13, or 231 days, and the Canadian canal from April 21 to December 15, or 239 days:

	U. S. canal.	Canadian canal.	Total.
East Bound.			
Copper, net tons	92,474	9,261	101,735
Grain, bushels	22,869,602	20,583,581	43,453,183
Building stone, net tons	1,019	.....	1,019
Flour, barrels	3,767,473	1,935,412	5,702,885
Iron ore, net tons	17,251,898	7,375,690	24,627,588
Pig iron, net tons	18,962	.....	18,962
Lumber, M. ft. B. M	423,513	30,248	453,761
Wheat, bushels	48,131,791	57,910,082	106,041,873
General merchandise, net tons	80,374	29,864	110,238
Passengers, number	12,325	14,708	27,033
West Bound.			
Coal, hard, net tons	1,023,686	361,057	1,384,743
Coal, soft, net tons	6,494,563	2,023,154	8,517,717
Flour, barrels	20	1,470	1,490
Grain, bushels	700	4,700	5,400
Manufactured iron, net tons	143,514	126,832	270,346
Iron ore, net tons	.....	22,752	22,752
Salt, barrels	448,510	98,713	547,223
General merchandise, net tons	402,406	330,257	732,663
Passengers, number	10,754	15,500	26,254
Summary.			
Vessel passages, No	9,891	5,290	15,181
Registered tonnages, net	21,487,499	9,604,231	31,091,730
Freight:			
East bound, net tons	20,525,839	9,854,919	30,380,758
West bound, net tons	8,131,458	2,878,341	11,009,799
Total freight, net tons	28,657,297	12,733,260	41,390,557

The iron ore movement in 1908—24,650,340 net tons—compares with 39,594,944 net tons in 1907. The pig iron and manufactured iron total in 1908 was 289,308 net tons, against 307,941 tons in 1907. The copper tonnages were 101,735 and 89,959, respectively, an increase of 13 per cent. in 1908. The wheat movement for 1908 was 106,041,873 bushels, an increase of 7,906,098 bushels, or 8 per cent.

The steel steamer Theodore H. Wickwire, which the Great Lakes Engineering Works is building for the American Steamship Company, Buffalo, was launched December 19. It will carry ore for the new blast furnace of the Wickwire Steel Company at Buffalo. The dimensions are 464 ft. length over all, 444 ft. keel, 56 ft. beam and 28 ft. depth.

An Automobile's Cost Analyzed.

An interesting analysis of the cost of a touring car, with reference to its various parts, has been made in the London *Graphic* by the general agent representing a manufacturing company in Great Britain. He says:

"We have made the following table, showing for our principal type of car, the 14-hp. chainless, the percentage of cost of raw material and parts which must be purchased before commencing to manufacture a series of chassis:

Details.	Per cent.
Tires	21.7
Steel	10.6
Aluminum castings	9.2
Axles	8.4
Rubber tubing, aprons, nuts, bolts, &c.	8.2
Magneto and fittings	8.2
Ball bearings	7.4
Radiator	6.4
Chassis	3.8
Bronze castings	3.4
Forgings	2.8
Springs	2.6
Cast iron	1.8
Steel tubing	1.5
Paint work	1.4
Lubricating materials	1.4
Woodwork	1.2
Total	100.0

"From an examination of this table one can deduct some very interesting points. The proportion of tire cost is astonishing, and the first question to be taken into consideration is the great importance of the weight of a car, this weight being the criterion of the initial cost of tires, as well as their up-keep afterward.

"The second item of cost is steel. In a 14-hp. car 1300 lb. of steel of various types and qualities in the rough is required. A saving of 1 penny in the cost of each pound would, therefore, reduce the cost by £5 8s. 4d. The price of steel can vary from a few pence per pound to 2s. and more per pound, and one can imagine what difference it can make in the cost of a car to use good or common steel. By replacing aluminum with cast steel or iron a new economy would be realized, but again the important question of weight would interfere, and the economy would only be for the manufacturer.

"Then comes the front axle, a point on which rests the safety of the occupants of the car. A good axle costs anything up to £20, some racing axles cost £70 or more, whereas a cheap axle can be bought for £2 or £3. To all outward appearance they are identical, and nobody would be able to recognize the good one from the cheap one.

"An expensive magneto, and a good radiator can be replaced by common and cheap types, but with this reduction in price there would be a proportional increase of possible breakdown. The sundries and other parts come to a more moderate proportion, and certainly an economy could be realized on most of this material.

"Next comes the cost of time of manufacturing. With well equipped works, well designed tools, and, if the cost of labor is not excessive, the men's time expended on a chassis amounts to about 10 per cent. of its value.

"What is more expensive and important is the case hardening and tempering, and then the necessary rectification of all the working parts. If these operations are not made the machines at the beginning would certainly look identical, and the cheap one would run as well, if not better, and more silently, than a car more conscientiously made; but after a time all the soft moving parts would commence to wear, and then the car would rapidly go to pieces, and it would be impossible to have it repaired. Case hardening, tempering and rectification are expensive operations, but are the only guarantees against wear and tear.

"The general expenses, advertisement and normal trade profit are generally in good firms in proportion to the amount of output, and are points which it is more difficult to account for."

Automatic Metal Bottle Cap Machinery.

In the following is described an automatic equipment for the rapid and economical production of a two-piece bottle cap designed to meet the requirements of the general bottling trade. The entire plant was designed and built by the V. & O. Press Company, Glendale, L. I., and the cap is being manufactured by the National Metal Seal Company, Portland, Maine:

Fig. 1 shows the cap: A is the cover, B the body, C the cover washer, D the body washer and E the assembled cap applied to the bottle. As shown, the body piece of the cap is held to the bottle by spring lugs, which fit the lip on the bottle neck. The cover piece is pivoted to the body, and as it is swung to position the curved extension opposite the pivot engages the under side of the lip of the bottle, holding the cover firmly in place.

With an ordinary press and die equipment the cover and body would each require five separate operations; the cover and body washers, each one operation, and the assembling would require four operations. Fig. 2 shows a battery of four automatic presses, which constitute the equipment for making the complete cap and include the body washer machine, the cap body machine, the cap cover machine and the assembling machine. With this automatic plant the cap, including cover, body and both washers, is made and assembled in four operations, and the handling of the caps is almost entirely eliminated.

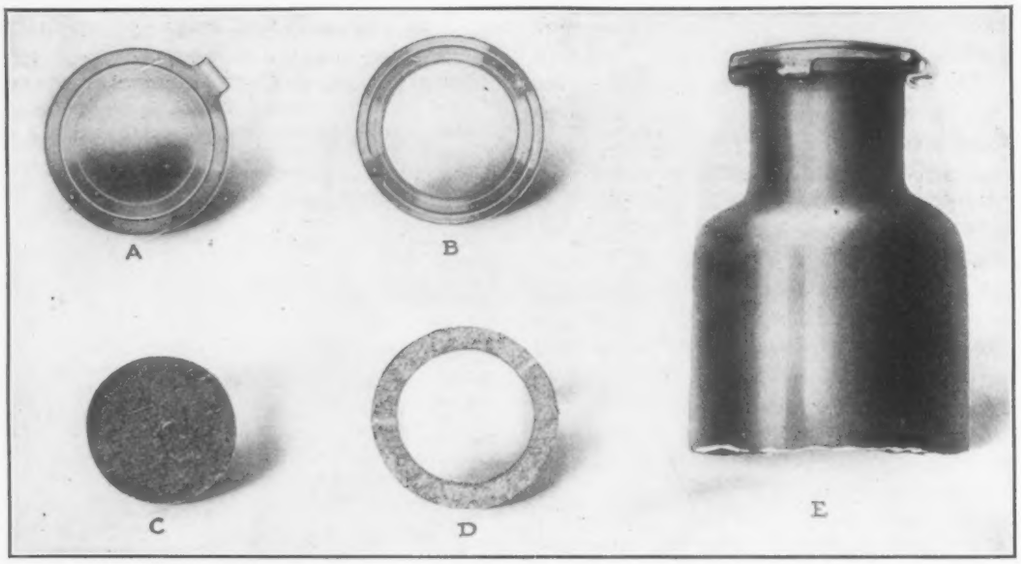
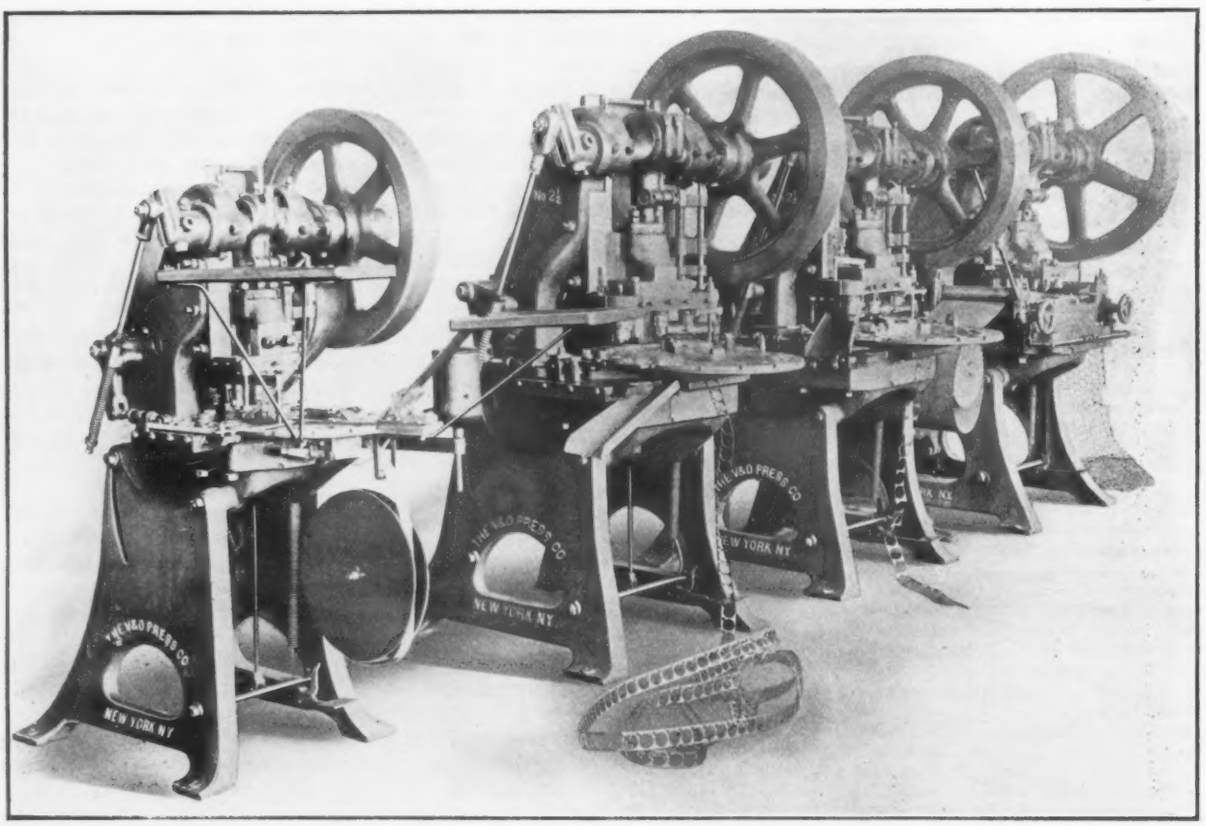


Fig. 1.—The Bottle Cap.—A, the Cover; B, the Body; C, the Cover Washer; D, the Body Washer, and E, the Assembled Cap Applied to the Bottle.



Assembling Machine. Cap Cover Machine. Cap Body Machine. Body Washer Machine.

Fig. 2.—The Complete Equipment for Making the Cap, Built by the V. & O. Press Company, Glendale, L. I., for the National Metal Seal Company, Portland, Maine.

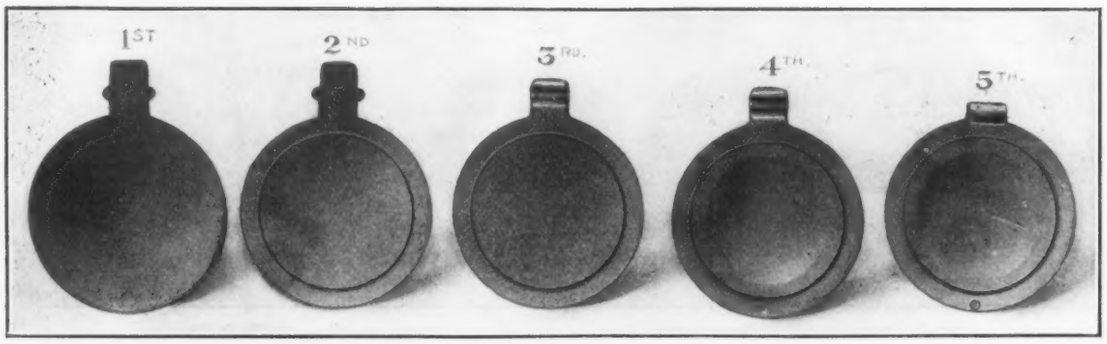


Fig. 3.—The Five Operations on the Cap Cover.

The Cap Cover Machine.

Fig. 2 shows the machine for making the cap cover. It is a single action dial feed press equipped with stock reel, roll feed, safety stop and a series of five punches and dies. The material from which the cap is made is ribbon steel furnished in coils. An automatic rack driven roll feed pushes the steel through the blanking die. As the slide descends the blank, Fig. 3, is cut from the strip of steel and forced into a hole in the dial. The dial acts as a carrier and gauge. On the following up stroke the dial revolves, one step carrying the blank to the second punch and die of the series which partially form the raised center. Similarly the piece is moved from the second to the third position, where the extension on the blank is formed up into a locking lip. In the fourth operation a dome shape is given to the raised center, and at the same time a small depression is formed which serves as a stop when the cover is swung to its closed position. In the fifth operation the locking lip is bent to the proper angle and an eyelet drawn up for the purpose of riveting the cover to the body. After the last operation the piece is automatically ejected through the chute shown at the left of the machine. The five separate steps are simultaneously performed on five pieces, so that each stroke of the press completes one cover. The machine operates at 70 strokes per minute. A suitable latch is provided so that the press may be run continuously without holding the foot on the treadle. In effect, five operations are performed as one, the machine draws in the material and ejects the finished cover. The press has a running speed far above the ability of an operator to perform separate operations. Therefore the single automatic machine with one operator will do nearly double the work possible with five plain presses and as many operators. Furthermore, the product is absolutely uniform, there is no waste from improper gauging, and no danger to the operator.

The Cap Body Machine.

The body piece is made in a machine, Fig. 4, very similar to that described for making the cover. It also is a single action dial feed press, equipped with stock reel, roll feed, safety stop and a series of five punches and dies. By means of the roll feed, the steel is pulled from the stock reel and fed through the blanking die. As the slide descends the blank, Fig. 5, is cut and forced into a gauge in the dial; the dial revolves step by step, carrying the piece through the series of dies, which operate as follows: In the second operation the piece is drawn to about ⅛ in. depth and the four projecting lugs bent up at right angles; a strengthening bead is also embossed in the top. In the third operation the center opening is cut out. This may be cut round, as shown, it may be perforated or slotted, as desired. In the fourth operation a hole is punched for the admission

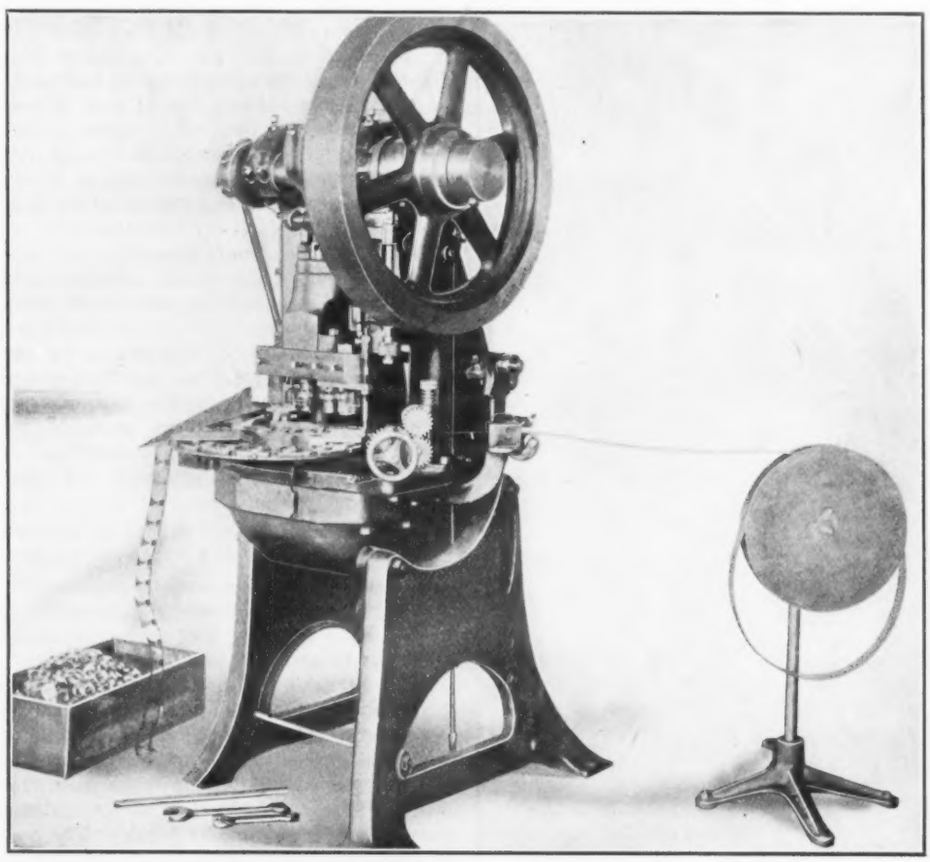


Fig. 4.—The Cap Body Machine.

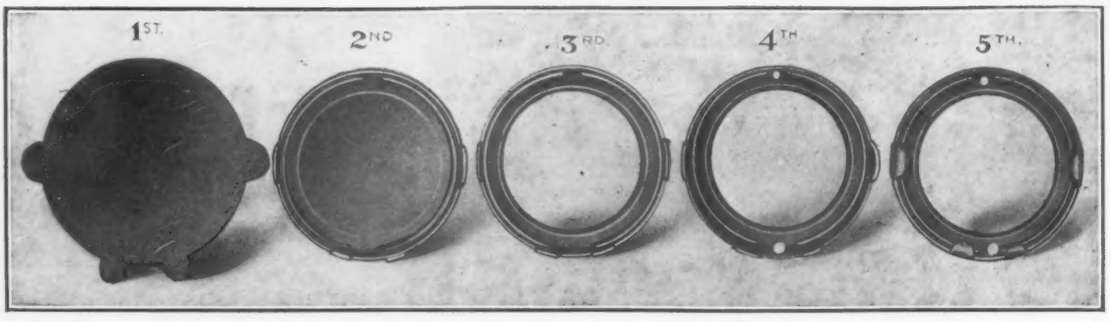


Fig. 5.—The Five Operations on the Cap Body.

of the eyelet on the cover, and at the same time a small bump is formed which engages the depression in the cover forming a stop when the cap is closed. In the last operation an automatic die curls the lugs to a shape corresponding to the outline of the bottle lip, and finally ejects the finished piece through the chute, at the rate of 70 per minute.

The Assembling Machine.

While the assembler does less actual work than the cover or body machine just described, yet its operation is perhaps more interesting than either. This press, shown in Fig. 2, is a dial feed machine equipped with the regular safety stop, a stock reel, roll feed, water tank, moistening pad, two chutes and a series of dies. The cap covers are fed into the right hand chute at the lower end of which is an automatic release, which delivers one cover into each hole of the revolving dial. By means of the roll feed a strip of felt, gummed on one side, is pulled from the reel across the moistening pad and through a cutting die. As the slide descends, a washer is cut from the strip of felt and inserted in the cover, which has been brought to position by the motion of the dial. On the up stroke of the slide the dial revolves one step, and as the slide descends for the second time, the cover is subjected to pressure assuring the adhesion of the gummed washer. The next step of the dial carries the cover to the mouth of the second chute from which is delivered the cap body (this chute is also fitted with an automatic release which properly times the fall of the body). The body piece thus controlled takes its position upon the cover and the riveting punch descends riveting the pieces together by means of the eyelet already mentioned. This eyelet is less than ⅛ in. diameter, therefore absolute precision is required in locating the hole in the body exactly over the eyelet on the cover. This is accomplished by a reciprocating mechanism attached to but moving in advance of the riveting punch. After this operation the assembled cap is ejected. Thus this machine cuts the cover washer, pastes it into the cover and assembles the cover and body, combining these operations in one and having a speed of 70 strokes per minute. It is of course understood that the various operations described are performed simultaneously so that after the first cap has gone through the complete series, then each following stroke of the press completes one cap.

The safety stop mentioned in connection with the dial feed machines is worthy of brief description. This attachment is connected with the clutch which by means of the eccentric shaft actuates the slide. Its purpose is to stop the action of the press in case of the improper alignment of the dial. In other words, if for any reason the dial is prevented from assuming its absolutely correct position in relation to the punches and dies the safety stop disengages the clutch and stops the press. Its action is positive and on dial feed machines equipped with an expensive set of dies the value of the device cannot be overestimated.

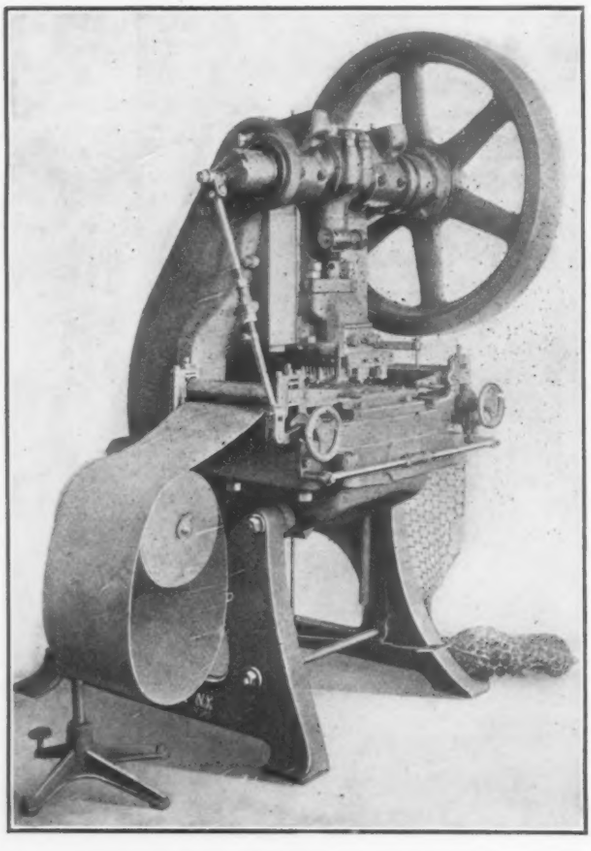


Fig. 6.—The Body Washer Machine.

The Body Washer Machine.

The machine for the body washer, Fig. 6, is a regular V & O No. 4 inclinable press, equipped with an automatic positive release double roll feed and a nest of nine punches and dies. By means of the roll feed, the material, which is furnished in coils of the proper width, mounted on the reel at the left, is drawn through the dies which cut nine complete washers at each stroke of the press. The roll feed carries off the scrap to the right of the machine and means are also provided for the separation of the center punchings from the finished washers. The output is over 30,000 washers per hour, enough to supply the bodies produced in seven of the cap body machines. In addition to the enormous output possible on this machine, it offers the advantages of accurate and uniform product and the greatest economy of material. After the caps leave the assembler, these body washers are inserted by hand. It is to be noted that this is the only hand work required in the manufacture of the cap.

Advantages of the Automatic Plant.

In conclusion, it is of interest to make a brief general comparison between automatic presses and plain presses —*i. e.*, between presses equipped with a series of dies and automatic feeds, and presses with single, hand-fed dies. It is assumed that the article is to be manufactured in large quantities. The cost of installation for a given output averages only slightly more for automatic machinery. (It is to be remembered that an automatic machine producing an article requiring, for example, five operations, will do more work than five plain presses. This is due to the fact that the automatic will feed faster than is possible by hand.) The cost of operation is from two to five times higher for plain presses. (One operator only is required on the automatic machine.)

The automatic machine occupies less space. The product of the automatic machine shows greater uniformity. (This is due to accuracy of gauging; slight variations will occur in plain presses through improper gauging.) The dies in the automatic press wear longer. (An operator on a plain press will often cut a half blank or even place two blanks in a forming die; this can't occur in the automatic press, therefore, there is less wear to the dies.) Danger to the operator of the automatic press is eliminated; the hands at no time are near the dies. On plain presses each piece must be placed in the dies by the hands and accidents are common.

Progress in Submarine Craft.

BY ROBERT G. SKERRETT, NEW YORK.

Despite setbacks, accidents and the skepticism of the older naval men who believed only in the might of the battleship, submarine vessels have continued to grow in size and military importance. A few years ago they came to us directly from the inventor's hands and showed all of the hall-marks of engineering inexperience. Enough, however, stood to the credit of those pioneer efforts to prove that their designers' claims were not unfounded, and at once the trained technical man set his mind to smoothing out the rough places and to reducing experimental data to figures of scientific value. Since then submarine craft have progressed rapidly, and to-day the best of them bear the impress of thoroughly serviceable units in a scheme of seaboard defense. No small part of this is the consequence of the general march in the mechanic arts, but the major part of the progress is directly attributable to the scientific analysis of the causes leading to the accidents that have shocked us. When all is said, the under water boat has established its reason for being by a relatively moderate loss of life; and it has been only the harrowing circumstances surrounding this sacrifice which have seemed to give added gravity to the price paid.

British and French Developments.

The stiff necked character of the official pride which Great Britain has in her navy caused that nation to be slow in adopting the submarine. It was said by one of her leading ministerial authorities that the submarine was merely the weapon of the weaker nation—it could have no excuse for recognition on the part of England, but the error of that position was duly focused in the light of contrary activity on the part of her neighbor across the Channel. To-day the British navy, next to France, has the greatest number of submarine vessels, while in measure of displacement the flotilla of Great Britain exceeds that of France. Such has been the radical change in British official opinion.

Both Great Britain and France have accomplished very creditable results with their boats, and each of them has proof of the surface cruising endurance of those vessels. The British boats of 400 tons submerged displacement having covered 600 knots upon their gasoline supply and the French boats, under like conditions, having recently exceeded that record by nearly 100 miles. These performances not only indicate more seaworthy forms of hulls for these vessels, but show directly how the explosive engine has grown in reliability and efficiency. The latest French boats are of substantially corresponding displacement with that of the big British submarines.

The Remarkable Achievement of Italy.

Significant as these records are of improvement over the vessels of less than a decade ago, the recent achievement of the Italian submarine flotilla puts these performances quite in the shade. The Italian flotilla consists principally of four boats of only 220 tons submerged displacement, which were launched successively in 1905, 1906 and 1907, and which have taken part, as they were completed, in the naval manœuvers of the past three summers to the satisfaction of the authorities.

It was not until this season, however, that all four of the boats were able to manœuver as a unit, and it is putting it mildly in saying that what they did during the month of August just gone was startling. Part of the scheme of the naval manœuvers included a raid by these boats along both the Adriatic and the Mediterranean coasts, and the Glauco, Narvalo, Otaria and Squalo were called upon to make unassisted the run of nearly 1300 nautical miles from Venice to Spezia! The little boats accomplished this without mishap and with remarkable celerity, and arrived upon the scene of the grand manœuvers with their crews in splendid condition and able to take their part in the concluding operations in connection with the combined fleets. In this latter stage the little vessels were again handled by their officers and crew with so much skill that the king summoned them aboard the flagship Vittorio Emanuele and personally congratulated both the commanders and the enlisted men. One of the circumstances leading to this rather unusual honor was the especial performance of the Glauco, the first of the flotilla completed, which in broad daylight was able to actually hit the battleship Saint Bon twice, despite the vigilance of picket boats and the watch aboard the big ship, before rising to the surface and showing her nearness.

The position of excellence won by the Italian boats is of particular interest because Italy did not figure conspicuously until within the last four years in this branch of naval architecture. While England, France, Russia and the United States were spending large sums of money in buying or building various types of submarines, Italy was going along in a quiet way experimenting with her old submarine, Delfino, modified. The lessons thus learned at a modest outlay were carefully evaluated, and the Glauco and her remarkable classmates have been the outcome. Surely the records made by these little vessels stand out in brilliant contrast with the results recently secured from our own boats during their run to Philadelphia and return to New York, a distance each way of approximately 300 miles.

Statistics of Submarines Built or Building

The following table shows the number of submarine vessels built, building, or authorized in the various maritime nations, distinguishing between the submarine and the submersible, the latter being a seaworthy evolution of the former:

	Before 1902.		Since 1902.		
Nation.	Submarines.	Submersibles.	Submarines.	Submersibles.	Total.
France	31	5	10	52	98
England	6	0	14	34	54
United States	8	0	11	1	*20
Italy	2	0	0	5	7
Russia	8	1	8	13	30
Japan	0	0	7	0	7
Germany	0	0	0	10	10
Sweden	0	0	1	1	2
Holland	0	0	1	0	1
Austria	0	0	0	4	4
Norway	0	0	0	1	1
Denmark	0	0	0	1	1
Totals	55	6	52	122	235

* Congress at its last session authorized the construction of eight more submarine torpedo boats, and competitive bids for these vessels were opened at the Navy Department on November 2. It will probably be some little while before we know anything at all about these boats, as the details will naturally be kept secret.

The Submarine May Displace the Destroyer.

The development of submarine craft has provoked very serious discussion as to the advisability of abandoning the further building of high speed surface torpedo boats of the well-known destroyer type. These vessels in order to attain the high speeds now demanded and to be seaworthy have grown to such sizes that they make very considerable targets for the rapid-fire guns of a modern fleet, and at night are apt to betray their approach either by reason of their size or the disturbance they make in the water when running at high speeds. Their primary duty is that of scouting and their torpedo armament is carried more as a secondary consideration, and in the hope that they may be serviceable in case of an opportunity of a more or less remote character. It is urged that the destroyer be abandoned and that scouts, pure and simple, be built in their stead, and that submarine craft be developed for the primary pur-

pose of providing a satisfactory mobile base from which to discharge torpedoes. The modern submersible can be made ready to dive in 6 min. after she has been running on the surface in light trim, which is a very material gain in powers of quick disappearance over the 20 or 30 min. called for only a short while ago for vessels of very moderate displacements. In addition to this the latest boats are able to run in cruising trim at a speed of 15 knots an hour, while they are accredited with submerged speeds of 9 knots an hour.

In broad daylight all that the submarine craft shows above the surface when making an attack is the slender tube and small head of her observing instrument, and this is now so installed that it can be thrust above the surface or withdrawn out of sight without altering the depth of submergence of the submarine boat. As the attack upon the Italian battleship showed, and as experience during a number of the French manœuvers have substantiated, it is possible for these vessels to get within striking distance of their targets in broad daylight. Striking distance does not mean now getting within range and there blowing a whistle or giving some other signal of being near, but torpedoes are now fired having collapsible heads which permit without fear of damage of actual blows or hits being recorded. It was this very type of torpedo that showed how fallacious were the probable powers of the surface torpedo boat in attack, because only actual hits were allowed to count and only those hits made against predetermined ships.

The Automobile Torpedo.

The average layman does not realize how the automobile torpedo has been developed within the past few years, and how its range, its speed and the force of its destructive blow have been increased. The attack upon the United States steamship Florida gave a fair idea of its powers to damage under the most restricted circumstances, and a blow of that sort under the engine space would probably paralyze a ship's motive force, while the explosion of a torpedo under any one of the magazines would probably lead to the immediate destruction of the vessel. It was not very long ago that 800 yards was considered the probable maximum efficient range of the torpedo, and yet to-day, by reason of the use of a superheater, the motive air capacity of the torpedo is doubled and the range has widened to a distance of 4000 yd. at a speed of 28 knots, while for the first 1000 yd. the big 18-in. torpedo can be driven at a speed of 43 knots an hour! It is quite impossible to make use of this maximum range from any surface torpedo craft during daylight, and daylight is necessary in order to enable the torpedo to be properly aimed at a moving target.

As a surface torpedo boat cannot do this work without inviting well nigh certain destruction, the submarine boat is apparently the only torpedo craft that can lie at a distance of 4000 yd. in the daytime, submerged of course, and profit by the increased range which has been given the up to date torpedo. The periscope of a few years ago would have made this quite impossible, because its defective optical properties gave no idea of true distances after an object had passed 200 or 300 ft. away. To-day, thanks to the genius of the optician, this difficulty has been overcome, and the officer in command of a submerged submarine is able to judge with remarkable accuracy the approximate range of his target, while further improvement has given to this eye of the submarine all of the properties of a good night glass for making observations after dark.

The submarine vessel is thus surely coming into its own, and it is but another proof of what can be expected when a field of usefulness is established for any military instrument and the inventor and his more finished brother, the technicist and practical man, put their heads together to solve the problem and to meet a commercial demand.

Vollkommer & Hagan, contracting engineers, Empire Building, Pittsburgh, have commenced work on the erection of heating furnaces and other construction at the new plant being erected by the National Sheet Steel Company, Mansfield, Ohio.

The Ultimate Internal Combustion Motor and Its Probable Fuel.

BY THOMAS L. WHITE.

Perhaps the truest thing that can be said by way of a review of present practice in the design of automobile motors is that we are drawing to the close of a period of empirical construction and entering upon a period of systematic research. The principal need of the designer at the present time is for the kind of information which the steam engineer derives from his steam tables, and, speaking of the well defined field covered by the power equipment of the self-propelled vehicle, the indications are that in the present state of our knowledge no structural changes of a radical character are probable, or even possible, even in the event of a failure of the gasoline supply, and that further gains in thermal efficiency can only result from a more thorough study of the physical and chemical changes which occur in the working fluid from the moment that it enters the carburettor to the moment when it leaves the exhaust.

There is no intention in putting forward these propositions to claim finality of design for the existing type of motor nor to minimize the importance of the fuel issue. They simply represent the facts. It is significant, for instance, that although the high compression alcohol motor has a thermal efficiency of over 30 per cent., and alcohol is cheaper on the Continent than gasoline, there has been practically no attempt in France or in Germany to install this type of power plant in the automobile. It is equally significant that the Automobile Club of France is now offering a prize of 40,000 francs, not for a suitable equipment to burn alcohol, but for a "cheap fuel for general use and for a suitable device for its gasification, which must both be adaptable to all motor systems."

Limitations to Change in Engine Design.

The fact of the matter is that the present type of automobile motor is the outcome of a number of determining conditions of which the necessity of using gasoline was only one, and the current impression that it is the low preignition temperature of gasoline and air mixtures that has prevented the use of high compressions is only partially correct. There are other reasons which are just as cogent. One of them is that the high pressure motor is not suited for lay use. In inexperienced hands the compression is apt to be lost, owing to the piston rings and valves giving out through want of attention. Another is that the high pressure motor is a violation of the accepted canon of automobile design that power must be sought in the direction of speed and not in the direction of weight. Still another objection, and, perhaps, the most important of all, is that it is difficult to the verge of impossibility to control the ignition of a high speed motor under conditions of varying load, unless the quality of the mixture can be depended on to be absolutely the same at all speeds. Where the fuel is vaporized by the ingoing air this condition is rarely attainable. The same trouble is experienced with the high compression suction producer engine. Here it is the percentage of free hydrogen in the producer gas which varies with the speed of the motor, and the opinion is held by many engineers that the presence of this hydrogen, in spite of its great fuel value, is a positive disadvantage.

Engineering progress is not as a rule along the lines which are technically the most desirable, but along the lines which have been set by economic necessity, and as a reason, though not a technical one, for the conservation of the present type of motor must be reckoned the natural inertia of the existing order. This is inimical to revolutionary policies. From a business standpoint the introduction of a new fuel for use with the current equipment is a vastly better proposition than the introduction of a new type of motor to burn a new kind of fuel, no matter how good the latter may be. Also it must be remembered that gasoline will for many years be an alternative fuel. In fact, in some localities it will continue to be the only fuel obtainable, and as the automobile in its capacity as a long distance vehicle has no

fixed base of supplies, it will be necessary for it to be able to get along on gasoline on occasion, at any rate until the coming fuel is so widely used that a supply of it can always be depended on.

New Lines of Research.

If, as seems to be the case, the long supremacy of gasoline, and other causes of a less ephemeral character, have left a permanent stamp on the design of the automobile motor, then it is to the chemist that we must look not only for aid in the fuel question, but also for information about the phenomena of combustion, to enable us to use the type of heat engine which we have to the best advantage. The time has come when physical and chemical research must supplement a too narrow devotion to the purely mechanical side of motor engineering. To quote Prof. Vivian B. Lewes in this connection, "The engineer relies upon his indicator diagrams and tests of horsepower for information which could be much more easily obtained by analysis of the exhaust gases, and if this method of investigation were employed important advances would very soon follow. Analyses of the exhaust gases from motor engines are remarkably scarce. Indeed, I do not know of any in this country. But Mr. Sorel, in 1903, published in France some results in which he showed that with a motor running at 1061 rev. per min. and using 382 g. of gasoline per brake-horsepower-hour, the products contained unburned compounds which represented 82 per cent. of the hydrogen and 42 per cent. of the carbon present in the original fuel, thus reducing the heat value of the gasoline used in the cylinder from 11,278 to 5085 calories."

Almost identically the same contention is urged by Dr. Warschauer in a recent address presented to the Association of German Chemists of Berlin. "Until now the design of vaporizers for different kinds of fuels has been determined entirely by empirical methods. Right here the assistance of the chemist is required by the automobile engineer. By systematic qualitative and quantitative gas analysis data of great value can be derived regarding the character of the combustion of fuels. To take an illustration from the field of illumination, I will quote one of the most important propositions from Stepenoff's 'Theory of the Kerosene Lamp.' It is as follows: 'The efficiency of the lamp is best determined by the analysis of the gases given off.' The same truth with a suitable change in the wording can also be applied to the explosion motor."

The analysis of the exhaust gases from the explosion motor, important though it may be, is, however, only a step. It reveals the last stage of the complicated reactions which have occurred during the expansion stroke, but it affords little information as to the actual nature of these reactions or of the heat changes which accompany them. If carbon be slowly oxydized in the open air, as in the decay of wood, or almost instantly consumed behind the piston of an engine, the amount of heat liberated and the final product are the same. The difference is not in the process, but in the conditions under which it is conducted, and the final goal of the work of the chemical engineer is the determination of the how, why and when of those factors, which in the case of the decaying wood and of the burning fuel are so widely divergent.

Action in Explosive Mixtures.

Some of the results which are coming to light in connection with the study of the energy transformations which occur in the motor are sufficiently startling. Thus it appears that carbon monoxide is absolutely inflammable in the absence of water, and, further, the velocity with which an explosion in a mixture of this gas with air is transmitted depends on the amount of aqueous vapor present. Again, there are reasons for believing that the propagation of the flame in the cylinder of a gas engine is not by direct inflammation, but by the adiabatic compression to preignition point of successive layers of the mixture. It also seems that the old belief that carbon will burn to carbon dioxide in the presence of an excess of oxygen is not altogether well founded. Under certain conditions the lower oxide is just as likely to be formed as the higher.

The fact is that the idea that during the expansion stroke of an explosion motor the carbon and hydrogen of the fuel simply burn up more or less quickly must be abandoned. What really happens is infinitely more complex. Thus every reaction which can occur in the cylinder is reversible within the temperature, pressure and concentration limits of the cycle. Moreover, it is probable that the combustion of the mixture is far from being of a uniform character throughout its mass at any given moment. There is reason for believing that different reactions may occur simultaneously at different points of the working fluid. It is possible, for instance, that water is being formed and decomposed at the same moment during the same explosion.

Speaking of the investigations which are actually being made at the present, the determination of the rate of heat flow through the cylinder walls and the estimation of the specific heat of carbon dioxide at combustion temperatures are the subjects of recent monographs. The latter quantity is important in connection with the phenomenon of suppressed heat and in the determination of the proportion of a given quantity of hydrogen or carbon which can be oxydized under given conditions.

Mixed Fuels.

As there seems to be little doubt that the fuel which will take the place of gasoline will be a blend with an alcohol base, it is becoming important to be able to trace the effect of each individual ingredient in a mixed fuel. It may be pointed out that the properties of a blend are far from being a mere statical average of the properties of its constituents, for each admixture has a functional as well as a quantitative effect on the behavior of the whole in the motor. Thus the addition of acetylene to alcohol by accelerating its combustion in the motor increases its efficiency. Lastly, it may be mentioned that the increase of the calorific value of a fuel by blending has no effect on the specific power of the motor in which it is burned. The maximum power of a given motor is independent of the calorific value of the fuel which is used in it, the popular belief to the contrary notwithstanding.

The Torrington Company's Annual Report.

The income account of the Torrington Company, Torrington, Conn., which manufacture needles, &c., for the 12 months ended September 1 shows total receipts of $270,877, mainly dividends from subsidiary companies, against $294,291 in the previous year, and a deficit of $53,868, against a surplus of $4915. President Henry H. Skinner speaks confidently of the future and makes the following report to the stockholders regarding the company's subsidiaries:

"Your main plant is the Excelsior Needle Company, Torrington, manufacturing sewing machine needles, knitting machine needles and hook needles; also machinery and some other minor articles, employing from 900 to 1000 operatives when running on full time. The Standard Company, Torrington, of which you own 69 per cent. employs when running on full time, 250 operatives. This company manufactures spokes, nipples and pedals for bicycles. The National Needle Company, Springfield, Mass., manufacturing sewing machine needles, employs about 250 operatives. The Coventry Swaging Company, Ltd., of Coventry, England, manufactures bicycle spokes and nipples and sewing machine needles. The Metallwaaren Gesellschaft, m. b. H., of Aachen, Germany, manufactures sewing machine needles, knitting machine needles and hook needles. You also have important interests in two smaller factories in the United States. You maintain selling agencies in New York, Philadelphia, Boston, Brockton, Lynn, Milwaukee, London and Leicester, England; Glasgow, Scotland; Berlin, Germany; Vienna, Austria, and Buenos Ayres, South America."

The Iron City Coal & Coke Company, 704 Wabash Building, Pittsburgh, has purchased a half interest in the plant of the Brownsville Coke Company, Brownsville, Pa., consisting of 40 acres of standard Connellsville coal and a block of 50 coke ovens.

A Notable Low Pressure Turbine Installation.

A Rateau Regenerator and a 600-kw. Turbo-Generator Set at Vandergrift, Pa., Supplying Direct Current at 250 Volts.

A low pressure turbine plant has been in operation at the Vandergrift, Pa., works of the American Sheet & Tin Plate Company for several months. The entire equipment was contracted for, furnished and installed by the Rateau Steam Regenerator Company, which had already equipped (in 1906) a low pressure turbine plant for the International Harvester Company's steel works (now operated by the Wisconsin Steel Company, a subsidiary) at South Chicago. Both these plants utilize the exhaust of reversible blooming mill engines. As this type of engine works intermittently under extremely variable load conditions, the supply of steam varies considerably from one instant to another. In order to supply the turbine with a steady flux of steam a heat storage device, well known as the Rateau steam regenerator, is employed.

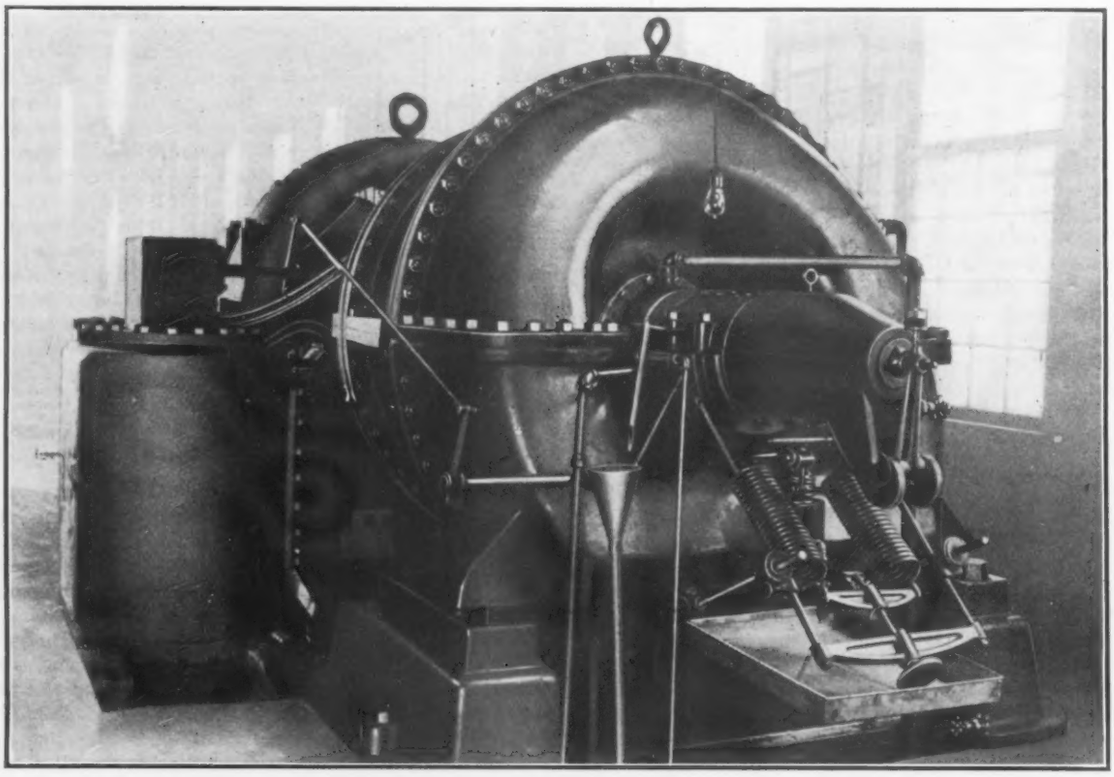


Fig. 1.—Rateau-Smoot 600-Kw. Low Pressure Turbine at the American Sheet & Tin Plate Company's Plant at Vandergrift, Pa.

The Steam Regenerator.

The heat storage capacity at the Vandergrift plant is such that a delivery of steam at the rate of 25,000 lb. per hour can be supplied to the low pressure turbine for periods of 2 min. During this period of 2 min. no steam whatever is admitted to the regenerator. The Rateau regenerator in this particular instance is 8 ft. in diameter by 40 ft. in length and contains some 45 tons of water. The steam coming from the mill engine is sent through this mass of water by means of immerged flues so arranged that the passage of the steam through the water maintains a very active circulation in the mass of liquid. The object of this circulation of water is to obtain a uniform temperature through the heat retaining liquid and to obtain a heat exchange as complete as possible between the incoming steam and the water contained in the regenerator.

The temperature of the water corresponds to the pressure of the steam in the regenerator and therefore varies proportionately to this pressure. The equilibrium between the pressure and the temperature in the regenerator is established, in one case when the water gets to a higher temperature by absorbing heat from the steam, and in the other case when the temperature of the water is higher than the corresponding steam pressure, the whole mass of liquid releasing part of its heat in the form of steam. A supply of steam is thus created when, on account of the insufficiency or absence of exhaust steam from the main engine, the turbine load requires more steam than is afforded by the main engine.

At the Vandergrift plant the range of pressures in the regenerator has been fixed from 3 lb. above atmospheric pressure to atmospheric pressure absolute. It will be seen that the temperature of the water contained in the regenerator will then have to be maintained always between 224.4 and 212 degrees. This variation of 12.4 degrees, when uniformally applied to a mass of 45 tons of water, is sufficient to regulate the periods of intermittence of the mill engine exhaust up to a maximum period of 2 min., during which time the mill exhaust would give no steam and the turbine would require steam at the rate of 25,000 lb. per hour.

From what precedes it is obvious that the storage capacity of the regenerator reaches a maximum when the entire mass of liquid is brought to a uniform temperature of 224.4 degrees. And when the pressure corresponding to this temperature is reached, or 3 lb. above atmosphere, a 24-in. relief valve, set to blow off at this pressure, instantly allows free exhaust.

A Reinforcement of Live Steam.

When the supply of exhaust steam is insufficient for the turbine, the equipment is provided with means for introducing a sufficient amount of live steam for its continued operation. The live steam enters the regenerator through a pressure controlled reducing valve, and the heat contained in the steam must first pass through the

water, thus giving between the high pressure steam inlet and the turbine the full heat storage capacity of the regenerator. As a direct result of this latter fact the admission of live steam to the system can be entirely out of proportion to the actual instant demands by the turbine for steam, because the storage of the regenerator absorbs live steam when it is in surplus and gives off steam when the live steam is deficient, in exactly the same manner as it operates when regulating the intermittent flow of exhaust steam. These variations are accomplished within a small range of pressure in the regenerator, and under no conditions will the live steam be exhausted to the atmosphere.

The great advantage of this when running on live steam is apparent from the well-known fact that a perfect control over an automatic pressure reducing valve has been heretofore almost an impossibility. The valve passes either too much or too little steam at each instant, but the average amount of steam passed, when taken for several minutes' interval, would be exactly equal to the steam required during that same interval by the turbine.

The entire mass of liquid in the regenerator acts as a flywheel for heat, storing up energy, or heat, when the steam is abundant, and giving up the stored-up heat when the supply of steam becomes deficient, or nil, this being brought about by the relations existing between the temperature of the water and the pressure of the steam in the reservoir.

It is evident from the above that the regenerator must be constructed in a way to assure the best possible mixture of water and steam in order to facilitate the exchange of temperatures between the incoming steam and the water acting as a heat retaining body. A 14-in. pipe leads the steam from the regenerator dome to the turbine inlet.

Rateau-Smoot Low Pressure Turbine.

The Vandergrift low pressure turbine is of the action type, utilizing the Rateau principle of drop in pressure from stage to stage. The complete installation, as shown in the accompanying illustrations, Figs. 1 to 7, has been designed by C. H. Smoot to meet American conditions and embodies interesting departures from the European type of the Rateau turbine. The Rateau-Smoot turbine was built at the shops of the Ball & Wood Company. There is no auxiliary whatever in this machine. The bearings are ring oiled, as ordinary dynamo bearings, thus avoiding the serious encumbrance and unreliability of oil pumps. The stuffing boxes are steam sealed to prevent air leakage, and are provided with multiple rings of carbon inclosed in a bronze housing.

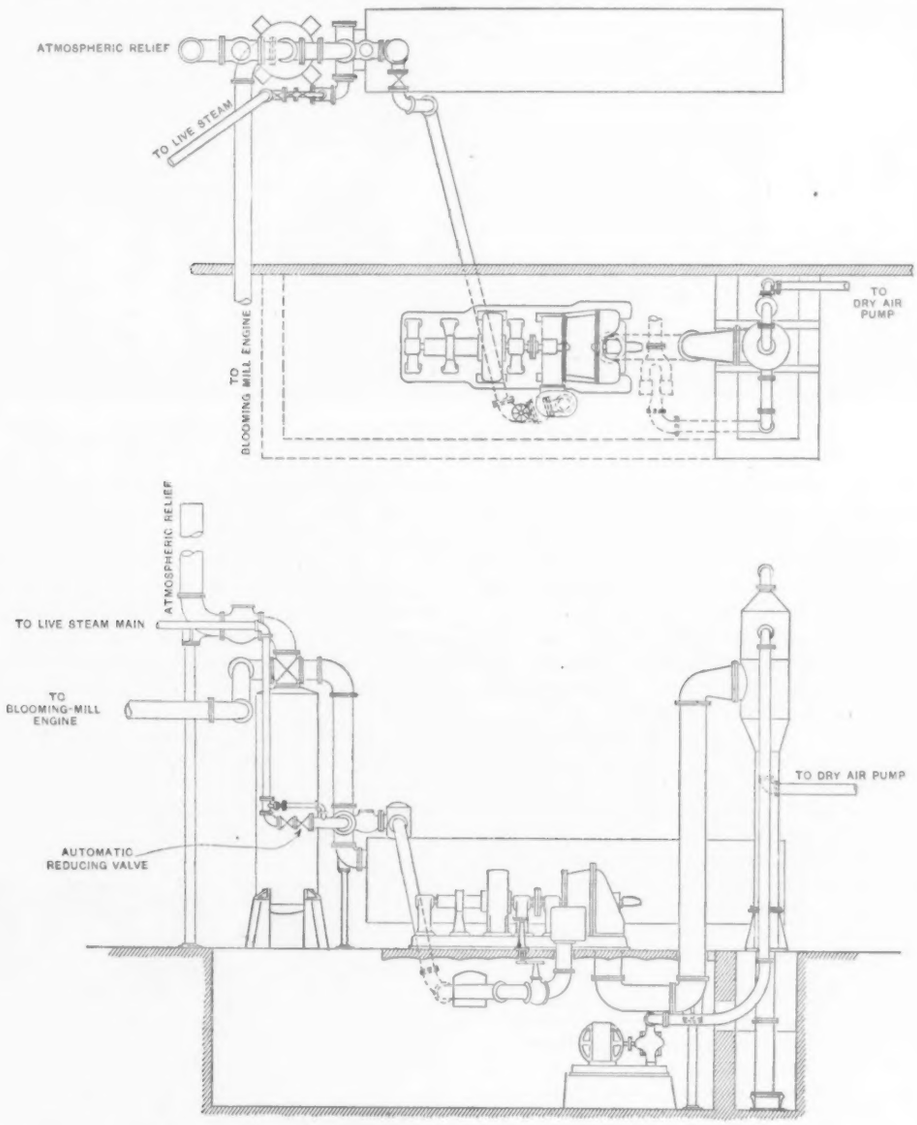


Fig. 2.—Plan and Elevation of Vandergrift Low Pressure Turbine Plant.

The turbine governor, shown in Fig. 1 and in detail in Fig. 7, is mounted directly on an extension of the turbine shaft and controls the steam admission by a positive, solid, mechanical connection between the throttle valve and the fly balls. No auxiliary apparatus is used in operating the valve, which is controlled entirely by the direct action of the fly balls. The governor thrust is opposed to the steam thrust and is about twice as great as the latter.

The action of the governor spring acting on the fly balls is regulated from the outside by means of springs mounted on a frame and connected to the governor links. The adjustability of the governor spring, through connections placed in such a way as to be adjustable during the operation of the machine, is of great value, as the normal speed can be altered without interfering with the opera-

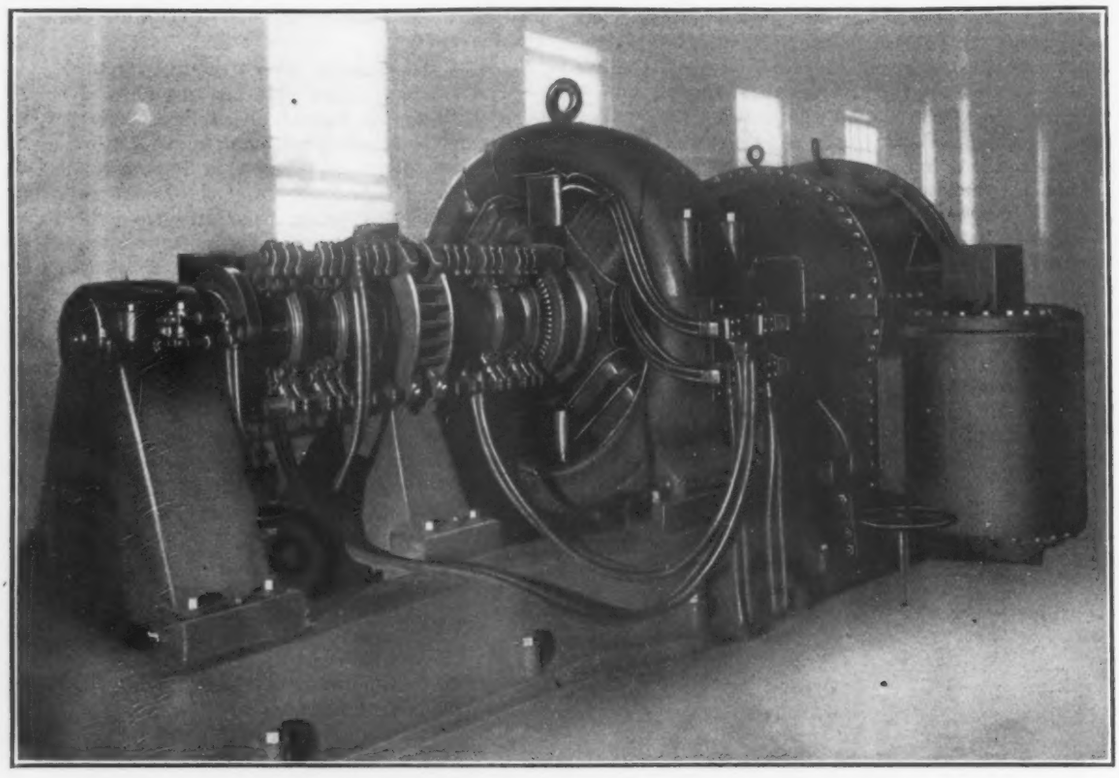


Fig. 3.—The Smoot Direct Current Dynamo in the 600-Kw. Turbo-Generator Set.

tion of the machine. The speed regulation obtained between full load and no load on the Vandergrift turbine is less than 1 per cent. The governor is connected to a balanced throttle valve. The governor valve discharges steam to the turbine through a housing supporting the high pressure bearing. This housing is designed in such a way as to allow the incoming steam to reach the first set of nozzles through an unusually large chamber. The reversal of the direction of the steam is then brought about under the most favorable conditions.

The turbine has six wheels 5 ft. in diameter. The capacity of the machine is 600 kw. and the speed 1500 rev. per min. The entire rotating element is designed with a high factor of safety, sufficient to permit the turbine to run twice its normal speed without causing a stress in the wheels which will exceed the elastic limits of the material employed. No close clearance is to be relied upon between the rotating and stationary elements of a turbine of this type. The two above features assure great reliability in operation.

The Dynamo.

The turbine is directly coupled to a 1500 direct current dynamo, 250 volts, through means of an elastic coupling consisting of two steel disks, one of which is perforated with circular holes, adapted to receive the pins protruding from the other half of the coupling. The holes of one-half of the coupling are lined with leather washers, in which the pins located on the other half of the coupling are adapted to fit. Thus through the medium of the leather washers the coupling has the desired elasticity.

The dynamo is of the commutating pole type, having four poles and four intermediary poles. The machine is of the open type, and has no forced air circulation. The commutator is in two sections, and is kept together by nickel steel rings, which give it the extreme rigidity necessary to overcome the considerable centrifugal force applied to its surface. The dynamo is supported by two bearings, ring-oiled. The exhaust of the turbine is connected to a Weiss condenser, in which a vacuum of 28 in. against a 30-in. barometer can be readily maintained.

Steam Supply and Requirements.

When carrying a load of 500 kw. the turbine requires less than 20,000 lb. of steam at atmospheric pressure—less than 40 lb. per kilowatt measured at the switchboard. The mill engine, when working under ordinary mill conditions, consumes some 70,000 lb. of steam per hour, and it will readily be seen that in using the balance of the exhaust of the mill engine in a low pressure turbine 1250 kw. more would still be available. In order to control the back pressure on the main engine a 24-in. relief valve is placed in the pipe leading the exhaust from the main engine to the steam regenerator. The valve opens at 3 lb. above atmosphere and immediately relieves the pressure as soon as it has reached this figure. This is illustrated in Fig. 4.

It is somewhat interesting to note that the steam delivered by the regenerator is dry saturated steam, and that all the water contained in the steam is separated when going through the liquid heat retainer.

The simplicity of this turbine installation is such that

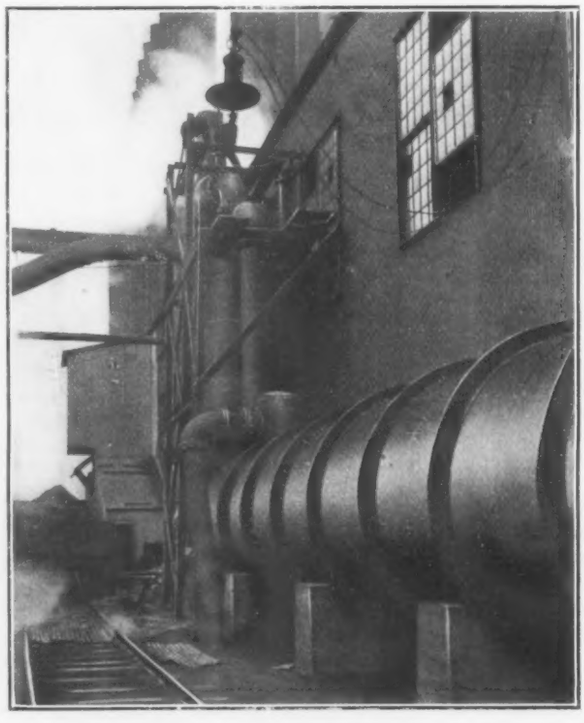


Fig. 4.—Steam Regenerator.—Steam Blowing Off at Relief Valve.

to put the plant in operation, the engineer in charge has only to start the water circulation in the water jackets, verify the amount of lubricant in the oil cavities, start the condenser and open the throttle valve, allowing the exhaust steam to flow through the turbine. No special attendants are therefore required.

The Development of Low Pressure Turbines.

The compounding of reciprocating engines with low pressure turbines has been advocated and put in practice by Prof. A. Rateau for many years. In 1902 Professor Rateau installed a 300-hp. low pressure turbine equipment, utilizing the exhaust of a hoisting engine at the Bruay mines in France. This machine is direct connected to two 250-volt direct current dynamos, running at a speed of 2000 rev. per min. It was then thought prudent by dynamo manufacturers to put two 150-hp. generators in parallel, on account of the high speed at which the engines had to run. In the years following the installation of this small plant, low pressure turbine plants have been installed in steel works, mines and power plants, aggregating a total output of considerably over 150,000 hp.

In the United States in 1906 the Rateau Steam Regenerator Company was sole contractor and builder of an entire low pressure turbine plant of 500 kw. for the International Harvester Company's steel works at South Chicago. This plant was the first in this country where the exhaust steam of a mill engine was utilized to drive a low pressure turbine. It was considered wise to equip the plant with two dynamos, direct coupled to the turbine, as no other direct current machines at that time had been built to run at 1500 r.p.m. when generating current at 250 volts. This plant has been in commercial operation for practically two years and has given good satisfaction.

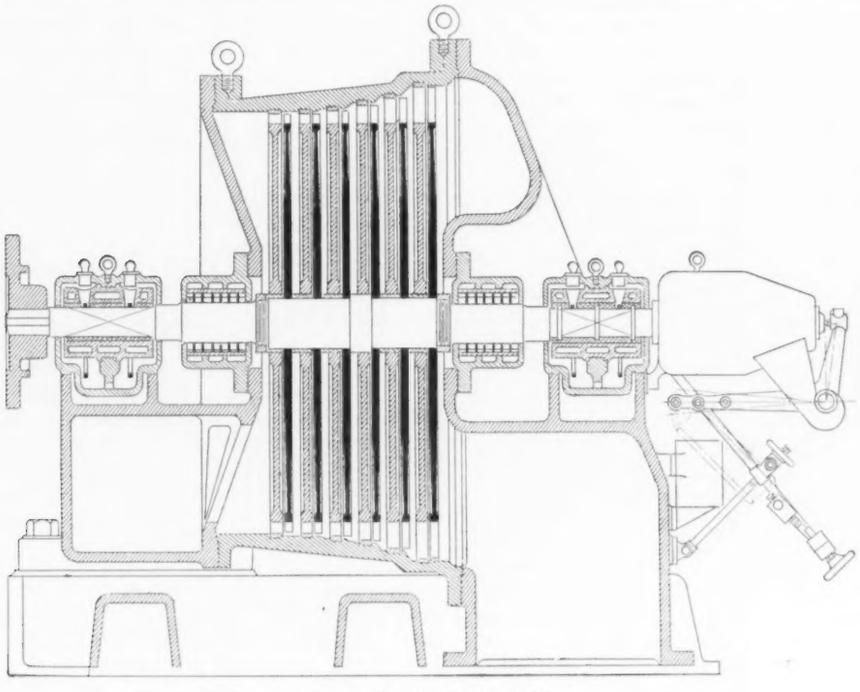


Fig. 5.—Section of Turbine.

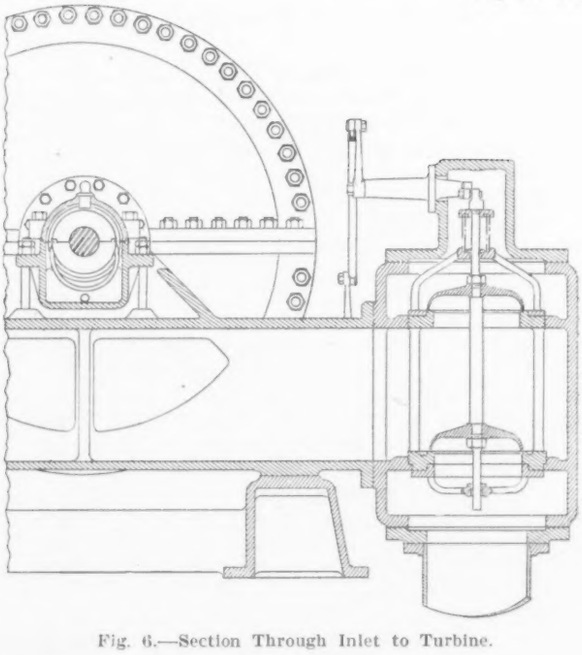


Fig. 6.—Section Through Inlet to Turbine.

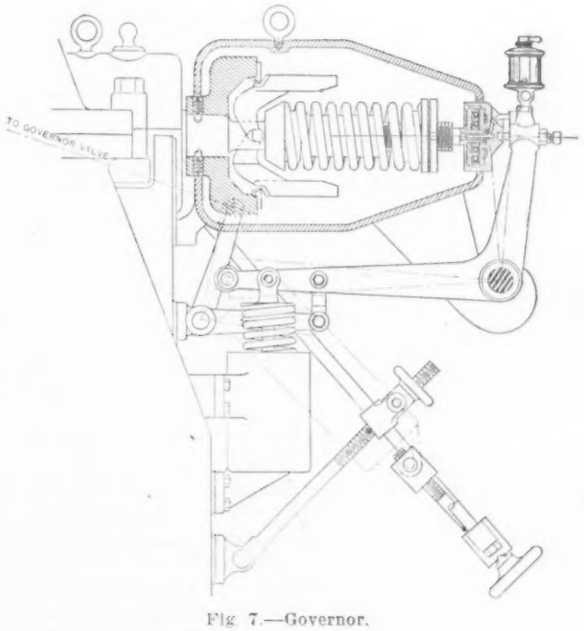


Fig. 7.—Governor.

The Vandergrift Generator Unique.

Later on the Rateau Steam Regenerator Company obtained the contract for the low pressure turbine equipment of the American Sheet & Tin Plate Company's Vandergrift works. C. H. Smoot, chief engineer of the Rateau Steam Regenerator Company, who had designed the dynamos for the International Harvester Company, had at hand sufficient data to build a 600-kw. dynamo in one unit, with the assurance that the commutation would be satisfactory at a speed of 1500 rev. per min. The electric generator, which is the largest direct current generator built in the United States for its voltage and for its speed, commutates as well as any type of slow speed dynamo. There is no sparking whatever at the

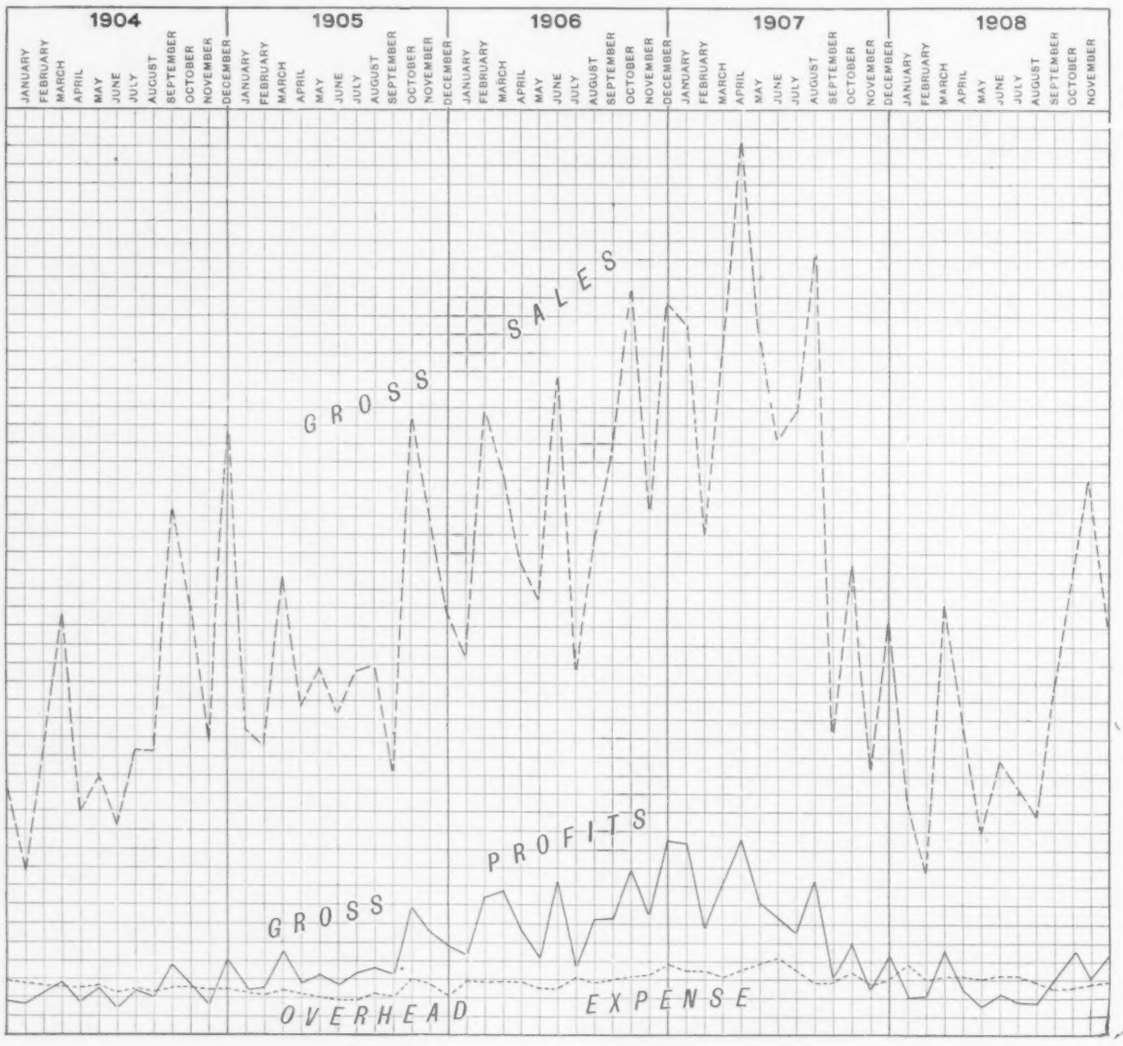
brushes and no special care has to be given to the commutator. It is quite obvious that if commutators of direct current machines had to be lubricated this would be a drawback in the power plants of steel works, where metallic dust is plenty. Serious inconvenience might be encountered from the fact that this dust would stick to the oiled surface of the commutator, and if sufficient care was not given to the machines, which practically run 24 hr. a day, short circuits could be established between the bars of the commutator and the machine would be injured.

The use of low pressure turbines utilizing exhaust from mill engines would not be complete if direct current dynamos—and direct current dynamos at 250 volts especially—could not be run at satisfactory turbine speed. It is very true that alternating current could be transformed, but if the distances to which the current is to be carried are short it is objectionable engineering.

both low and high pressure steam have been devised. As early as 1903 a Rateau turbine utilizing steam from three different sources at three different pressures was put in operation. One of the sources of steam was supplied by the exhaust of a hoisting engine regulated in a steam regenerator. The two other sources of steam were supplied from boilers at 80 and 175 lb., respectively. The steam admission was automatically governed between the high and low pressure sources in such a way that the steam would be used from one of the high pressure sources only when the low pressure supply was deficient.

The Curves of the Machine Tool Trade.

The accompanying chart shows the curves of the American machine tool industry for the five years just



The Curves of the Machine Tool Trade.

Adaptation to Rolling Mill Conditions.

From the foregoing it will be seen that through the medium of steam regenerators and low pressure turbines large amounts of power can be made available by the use of the exhaust steam of mill engines. The mill engine will always have to work under the most trying load conditions, and, on the other hand, the steam turbine will work under ideal conditions, on account of its being run with steam having a low density, therefore a large volume, and containing large amounts of heat within small ranges of pressure.

In plants where reciprocating engines operate with shutdowns of considerable length, a heat storage would become prohibitive on account of its size, and the admission of live steam through the medium of a reducing valve would also be very uneconomical.

In order to use the low pressure steam and live steam to the best advantage turbines utilizing automatically

ended, beginning with 1904. Three curves are given, each of much interest in itself. The upper line is the curve of gross sales. That following nearest it is the curve of gross profits, while that running along the foot of the chart is the curve of overhead expense. The chart has been maintained for years by one of the oldest and most important of the machine tool dealers. Its results have been checked off sufficiently with the experiences of other concerns in the same line of business, including both dealers and manufacturers, to indicate that they apply to the industry as a whole with comparative exactness.

The curve of gross sales is the most important measurement of the degree of prosperity or lack of prosperity in the machinery trade, but those of overhead expense and gross profits tell very interesting stories. By overhead expense is meant the total cost of conducting the business, but not including cost of the stock itself. The

difference between this line and that of gross profits constitutes the net profit or the loss.

The year 1903 was a poor one in the machine tool market. It will be seen that the curve of gross sales and that of gross profits start low in the scale for 1904. Business was done at a loss during more than one-half of that year. The spurt of the late winter was followed by a sharp reaction, but with the close of the year sales and profits went up suddenly. The general level was maintained until the last quarter of 1905, when the period of great prosperity arrived, with its ups and downs in the business of this particular house, which were probably duplicated with other dealers as the influence of exceptionally large orders or the lack of them was felt. The extreme high mark was struck in April, 1907.

The violent drop in the market in the autumn of 1907 is well indicated by the curves. Shortly after the New Year in 1908 there was a slight increase in business, and another upward movement in the spring, followed by the depressed summer and the revival of the autumn. It is especially interesting and suggestive to note the almost exact resemblance of the curve of 1904 to that of 1908. The same low level was reached, the same spring revival and summer slump and the return in the fall.

The fact that overhead or general expense varies little with general conditions of business is well exemplified in this chart. The curve advances slightly with the market; it is easy to see why this expense should grow as a business increases in importance. But in 1908 it did not return to the old low level and was comparatively little smaller than during the time of great volume of sales. While it is true that during the year the gross profits were slightly larger than in the prototype year 1904, yet the average loss was greater because of the greater increase in the expense curve.

Mexican Business in 1908.

DURANGO, MEXICO, December 24, 1908.—The year 1908 must be set down as an off one with respect to industrial activity and development in the Mexican republic. In some lines of business, indeed, paralysis rather than inactivity would be the word to employ in describing the situation. In the mining and smelting industries in general the latter word may be fitly applied as indicating the conditions which have ruled for the greater part of the year, and from which lethargic state, coincident with the settlement of the Presidential question in the United States, and the retirement of a threatened inimical law which promised, if passed, to affect them vitally, these branches have begun to emerge.

Although under a different government and in almost every way "foreign" to the United States, except in the matter of progressive ideas among her leading people, Mexico is so closely allied to her great northern neighbor, geographically and commercially, that disturbance of the financial and trade conditions in the United States cannot fail to have a detrimental reflex action upon the business world of Mexico. The depression which has ruled here for more than a year is eloquent proof of the sensitiveness of the pocket nerve which unites the two countries like a Siamese ligament. The upheaval in banking circles in the United States in the autumn of 1907 was immediately felt in the mining camps, in railroad construction operations and in other spheres of development whose activity is regulated in a great measure by monetary conditions abroad. The large commercial houses in the business centers—Mexico City, Monterey, Torreon, Durango and others—which in times of active business are heavily drawn upon for mining machinery, tools and material, noted a sharp falling off in orders at once, and this marked the beginning of a long term of depression in strong contrast to the former period of prosperity and quick movement of stocks. Railroad construction work was also greatly decreased, although the Mexican Central continued to push forward its west coast extension, and the Southern Pacific people kept busy upon that system's Mexican lines. The Central's important addition to the republic's transportation facilities is now completed and in operation. With the exception of one or two short roads to mines, to connect with trunk lines, or to oil lands in the course of exploitation, there have been no important developments in the railroad construction field. Rumors, however, are flying fast in regard to the alleged intentions of prominent United States promoters and capitalists in the Mexican field and to the south of it.

In some parts of the country the stress of the industrial situation has been further augmented by crop failures, or at least partial failures, for one or two years, which culminated in an advance in the price of cereals, principally frijoles (haricot beans), which form so important a part of the daily food of practically the entire Mexican people. In some districts the market price of this important food product has advanced during the past year 500 per cent.—far out of the reach of the poor. These conditions were chiefly responsible for the lawless acts of certain marauding parties of hungry and unemployed men some months ago in different parts of the country, which were magnified into the importance of a revolutionary movement directed against the government.

In one field of industrial development, and that a most important one—the drilling of wells for oil—there has been a good deal of activity. The English firm of S. Pearson & Son, Ltd., has taken the lead in this line of work, and with so much success as now to be in a position to compete in the marketing of illuminating oil with the company which has so long controlled the local trade. Other concerns are also engaged in sinking wells, and one such company is now constructing a line of railroad from the coast at Tuxpan to its oil lands in the interior. A large amount of capital has been invested in the petroleum industry, with the prospect of much more being placed in drilling wells, equipment, and at a later day, in the erection and operation of refineries.

In the domestic iron and steel manufacturing industry there have been no important advances. No new works have come into existence. The plant at Monterey has been kept running more or less actively throughout the year. Reports have been in circulation locally to the effect that a French syndicate, whose representatives recently visited the plant, might become interested in the works; there is, however, a certain element of the boom order in reports originating in Monterey which make it necessary to use caution in accepting them at their face value.

The unfavorable factors indicated in this review refer, happily, to the past. The closing months of the year have witnessed an unmistakable improvement in the general business of the country, the mining industry in particular showing a marked awakening. There appears to be every indication that a new stage of activity has been entered upon and that the coming year will be one of greatly increased business movement and consequent prosperity.

The advance in the price of copper, following heavy sales of the metal abroad, has had a very favorable effect upon the industry of copper mining here. Work is being resumed with increased energy upon properties which for months have been either idle or producing only in a restricted way. Higher prices for bar silver would be a great factor in hastening the advent of an era of prosperity throughout Mexico.

The year 1908 has been notable for one very important measure upon the part of the government—the inauguration of a scheme for the establishing of an adequate system of irrigation, which, when carried out, will reclaim from the desert millions of acres of cultivable lands. The necessity for such a movement has been indicated frequently. That the initial steps toward the accomplishment of this work have now been taken should be a matter of satisfaction to every Mexican who has at heart the well being of his country and the social elevation of his compatriots. D.

The Felker Bros. Mfg. Company, Sparta, Wis., has decided to locate its factory at Marshfield, Wis., where it will engage in the manufacture of well casings, galvanized steel tanks and other lines in galvanized iron.

The Nature and Treatment of Alloy Steel.

BY DR. JOHN A. MATHEWS.*

Paraphrasing the remark that has been made about books we may well say, of making many alloys there is no end and much study of them is a weariness to the flesh and small profit to the maker. It is hardly necessary at this late day that an article upon this subject should consist of long tables of remarkable physical tests—elastic limits above 100 tons, coupled with the elongation of molasses taffy or illustrated with photographs of steel tied into bowknots and large forgings distorted in shapes that would make the "human snake" turn green with envy. Too often in the past such data have raised bright hopes in the mind of a steel consuming public, and too often results in practice have fallen short of published data and perchance aroused a suspicion that published data always represent freak material and freak treatments or that the photographs represent enlarged photos of wire sizes.

A few generalizations in connection with these recent fascinating developments in the steel industry may serve a more useful purpose and help the user to obtain in practice results equal to those claimed by the maker. Let us then begin with the definition that "steel is a malleable alloy of iron and carbon which has been produced by casting from a fluid mass." Since by this definition all steel is an alloy, what is meant by "alloy" or "special" steels? While these terms are in general well understood, they are difficult to define, though they may be described.

Complex Combinations.

Two elements, iron and carbon, are all that are necessary to produce steel. Four other elements are always present—silicon and manganese, which are useful and essential, and sulphur and phosphorus, impurities whose effects even in homeopathic doses are by no means negligible. Copper and arsenic, aluminum, oxygen, nitrogen and cyanides are usually present in minute and negligible quantities. Ordinary steel, by whatever process made, is therefore a wonderfully complex alloy, though often spoken of as though it were an elemental substance. It may contain carbon and manganese from 0.10 to 1.50 per cent.; silicon from 0.02 to 0.25 per cent., and sulphur and phosphorus from 0.01 to 0.10 per cent., and the other elements named above which are rarely determined. Its complexity is further increased by the fact that iron and carbon may exist in several different physical conditions or combinations, while the intramolecular possibilities of the other elements are legion.

When to this very complex base material, other elements such as nickel, chromium, tungsten and vanadium are added, we begin to look wise and talk about alloy steels. Steels within the limits of analysis just mentioned serve an enormous number of purposes, and steel of a particular analysis adapted for rails, springs, knives or gun barrels may in a limited sense be called a "special" steel, but such is not the commonly accepted use of the term.

Effects of Additions to Carbon Steels.

When we materially exceed the limits just given or add elements not normally contained, such as nickel, vanadium, chromium, tungsten, molybdenum, &c., the product is called an alloy or special steel. Silico-manganese gear steel is an instance of an alloy steel containing no unusual elements but containing some of the ordinary elements in unusual amounts. Its analysis is about as follows: Carbon 0.50 per cent.; silicon 2.00 per cent.; manganese 0.60 per cent.

In such a case it becomes difficult to decide arbitrarily the percentage at which we pass from a regular to a special steel. Abnormally increasing the ordinary constituents or adding other constituents so changes the properties that new qualities appear and new purposes are served. The effects of such additions are made manifest in various ways which may be summarized as follows: 1. By changing the critical ranges and recalescent temperatures. 2. By modifying the condition in which the carbon exists. 3. By removing harmful occluded gaseous impurities. 4. By combining chemically with iron or carbon or both, and 5. Either combined or free, forming isomorphous solutions with iron or separating into distinct microscopic particles. By these means steel is improved or injured, hardened or strengthened, toughened or embrittled.

Notwithstanding its complexity, it is reasonable to expect, and much evidence has been brought forward to show, that steel and its alloys obey the laws of physical chemistry which hold good for simpler and purer alloys, namely, the laws of solution. The problems presented by steel alloys have engaged the attention of the world's leading chemists and physicists, and they have made rapid strides within a generation in elucidating the molecular relations of the elements of steel. They have isolated by ingenious methods many well defined chemical compounds, such as the carbides, phosphides and sulphides of iron and manganese. It remained for an American, addressing one of the leading scientific societies of our country, to discourse upon carbide of phosphorus (not in our chemistry), carbide of silicon (carborundum) and carbide of sulphur (foul smelling, endothermic and a solvent for rubber) as constituents of steel. As he also sang the praises of imported wares, it may be that we are behind the times over here and that these choice foreign products do contain such compounds. We have seen some American products that might be called "rotten," but they were not characterized by an appreciable odor of sulphide of carbon (CS_2).

Allotropic Modifications.

The complexity of steel from a chemical standpoint is further increased by the allotropic character of iron, and by the fact that carbon and probably sulphur and phosphorus may exist in several conditions or combinations. As iron is cooled from a molten condition, it has been discovered that at from one to three temperatures below its freezing point cooling momentarily stops. For carbonless iron these temperatures are designated as Ar_3 and Ar_2 and occur at about 895 degrees C. and 765 degrees C. When carbon is also present a third well marked arrest in cooling is noted at about 690 degrees C., known as Ar_1—the ordinary "recalescent" point. It is believed by many that the Ar_3 and Ar_2 temperatures indicate transition or critical changes in the nature of iron itself. In other words, that just as phosphorus may exist in two distinct forms, one yellow and one red, so the element iron is supposed to be capable of existing in different physical conditions at different temperatures. At temperatures above Ar_3 we have the "gamma" iron of Osmond, nonmagnetic and a solvent for both elemental carbon and iron carbide. Between the Ar_3 and Ar_2 temperatures we have iron existing in its "beta" condition, nonmagnetic but not a solvent for free or combined carbon. Below Ar_2 iron is in its "alpha" condition, magnetic but not a solvent for free carbon, but possibly a slight solvent for combined carbon. While some metallurgists do not accept this explanation of the significance of the critical temperatures and ranges, all concede that they do occur, and that other elements added to iron carbon alloys change, obliterate or modify the temperature ranges, and it is just on account of this that different steels require different temperatures for forging, annealing and hardening.

Types of Alloy Steels.

So much for the nature of alloy steels, and now a few suggestions as to their treatment and a few words as to the various kinds of alloys. The constitution of these products, chemical and physical, for generations remained unknown and a matter of speculation. Tremendous progress has been made of late years in clearing up a few of the obscure points. It was the writer's good fortune to

* Operating manager and director of the Halcomb Steel Company, Syracuse, N. Y.

have been initiated into these mysteries by the late Prof. Sir William Roberts-Austen and by Prof. H. M. Howe, recognized pioneers and leaders in the task of making a science of the ancient art of metallurgy.

The first commercial alloy steel, at least the first to make a great name for himself, was Mushet's air hardening tool steel. The next alloys to attract attention were of the structural types, and may be said to have had a public introduction when Riley presented a paper to the Iron and Steel Institute of Great Britain upon iron and nickel. Shortly afterward Hadfield's famous manganese steel was proclaimed and later he has produced many valuable products, especially in the line of armor and projectile steels. Along with the making of the new products has proceeded the study of their properties and methods of heat treatment. To-day a host of devotees, skilled in the science of heat treatment, apply their knowledge to the manufacture of tools, automobile parts and machinery to produce results never dreamed of a generation ago.

The principal types of alloy steels are those used (1) for materials of war, (2) for tools and (3) for materials of construction. The first are mainly alloys of nickel, chromium and tungsten or combinations of these elements. The makers of these alloys also conduct the heat treatments and guard their methods jealously. Alloy tool steels include air hardening and high speed steels together with a large number of steels of the "special" class containing relatively small amounts of alloying elements, giving them special characteristics and fitness for particular and severe requirements. One product of this class is remarkable in that it undergoes no change in form upon hardening; moreover, it hardens in oil sufficiently to make a remarkably good tap, cutter or die.

Nickel, Chrome-Nickel and Chrome-Vanadium Steels.

The alloys receiving most attention to-day are those of the third class—namely, materials of construction, and particularly the automobile steels. These are in general of three kinds—nickel steels, chrome nickel steels and chrome vanadium steels. Many different analyses are made under each class. The difficulty of producing sound nickel steel, free from pipes and seams, has injured the reputation of this most useful alloy with many users. This difficulty has been greater than need be because certain steel companies have mistaken a quality proposition for a tonnage proposition, and have offered nickel steel at absurdly low prices, wholly inconsistent with uniformity of analysis, careful workmanship and inspection. Discriminating users recognize this fact and are willing to pay a premium for the product of certain mills, because their steels are made in smaller tonnages and units, are more carefully handled from start to finish, are worked under hammers rather than in blooming mills, are made from purer materials and carefully inspected when done. The best is none too good for constructing the vital parts of an automobile, and when a concern has secured the best that the market affords, it has but taken the first step in producing good parts. Next come the forging and machining and the heat treatment, for better or worse. It is money wasted to buy good alloys unless one is willing to study them sufficiently to know how to treat them and then to supply adequate facilities for so doing.

The Need of Apparatus for Testing.

It is not to be expected that small users will install complete testing laboratories, but a few dollars invested in having occasional tests made will be well spent. There are, however, many large concerns that could and should spend, say, $5000, for which it is believed the whole or a large part of the following equipment could be obtained: The ordinary tensile machine, a microscope, electrical or gas furnaces capable of fine regulation, a good pyrometer, preferably recording. The tensile machine can also be used for making Brinnell hardness tests, spring deflection tests, &c. In addition to these some form of drop testing machine, such as the Fremont, will be found valuable; a vibratory or repetitive impact test is nowadays considered a necessity, while cold bending and torsion apparatus is useful. This equipment will be of small use, unless a thoroughly good man is put in charge—a careful, conscientious man of sound judgment. This man should direct the heating operations in the factory; he should construct furnaces which heat uniformly, and he should exercise eternal vigilance in keeping the pyrometric installations up to par.

It is a remarkable watch that never requires adjustment or repairs; a little attention is devoted to the upkeep of all apparatus and machinery, but the pyrometer is supposed to take care of itself. Too frequently it is never questioned, never calibrated. The best pyrometer of the thermocouple type should be looked over at stated intervals, especially if in constant use. Protecting tubes should be frequently examined and renewed, and electrical contacts looked over. Occasionally check up the millivoltmeter. Unfortunately there are many pyrometers of the thermocouple type on the market which cannot be watched too closely. Quite recently I visited two concerns where they were hardening the same grade of steel and doing it well. I asked each concern what temperature it was using. One said 1300 degrees F. and the other 1700 degrees F. The actual temperature in both cases was probably 1500 degrees F. Another so-called cheap pyrometer that I tested departed from the truth over 100 degrees in a month, and another was 50 degrees off when installed. In a lot of six couples tested after being in use some time, three were all right and three all wrong and by varying amounts. If you are going to use pyrometers by all means see that you have good ones and then see that they are systematically tested. Many people buy high priced alloy steels and get no better results from them than could be had from a carbon steel properly handled. If you cannot afford a good pyrometer stick to the trained eye of a skilled man; and if you have a good pyrometer employ a skilled man, anyway, and consider the pyrometer as an aid. With it you can at least give orders in temperatures rather than in heat colors, and the laboratory and works can meet on an intelligent basis. Pyrometers, like "smoke consumers," are all right if carefully watched and intelligently used. Too often both fail after about 30 days' use.

A Call for Conservatism.

The writer has probably devoted as much attention to the literature and fabrication of alloy steels as any reader of this contribution, and the more experiments and the more practical results he observes the more strongly he believes in the wholesomeness of straight nickel steel and certain of the chrome vanadium types. The ease with which these can be machined, especially in the cold drawn condition, is not least among their advantages. While not wishing to appear behind the times and recognizing the good there is in other classes of alloys, the writer believes the matter has been overdone and new products have not in all cases been sufficiently tried out before being put into actual commercial service. Some discrimination should be used in selling alloys where the user is not equipped to get his money's worth from the material. Heat treatment operations depend upon a solid scientific basis. And by this is not meant that steel essentially of inferior quality can be made to pass muster by heat treatment.

Noteworthy Result of Heat Treatment.

On the other hand, however, it might be said that alloy steel in its so-called natural state, as it comes from the rolls, hammer or drop forge, is almost unfit for automobile construction. Steel which depends upon alloys for a high elastic limit in its natural condition will have much less elongation than the same steel oil tempered and annealed. For example, a chrome steel gave in its rolled condition 158,000 lb. elastic limit and 5 per cent. elongation, with 9.4 per cent reduction of area. The same steel oiled tempered and annealed gave 153,000 lb. elastic limit, 14 per cent. elongation and 52 per cent. reduction of area. In other words, the material was transformed from brittle to tough, from treacherous to safe, without materially affecting its elastic limit. A nickel steel similarly treated had its elastic limit raised 20 per cent., with the reduction in area improved and its elongation unchanged.

We have tried to give some insight into the construction of alloy steels, the problems involved, the

means by which they may be attacked, and some precautions to be observed in the commercial handling of these valuable products. If anything here written shall increase the respect of the user of alloys for the materials he handles and for the men who produce them, and, better still, if anything herein shall stimulate a greater desire in the user to test and study alloy steel more carefully, and strive for practical results somewhat approaching the maximum potentialities of his materials, the writer's efforts will not have been in vain.

Manufacturers' Interests in Isolated Plants.

Defense of Independent Power Plants as Compared with Central Stations from the Standpoint of Operating Costs.

BY CHARLES M. RIPLEY, NEW YORK.*

The Interests Involved.

Factory managers are frequently approached with propositions to close down their power plants and buy electric current from the local central station. Those building new factories or adding to their buildings are similarly urged not to install an independent plant. Some of the trade papers devote considerable space to arguments against the isolated plant and in favor of central station interests. Associations of central station operators have been formed for the purpose of increasing their business by interchange of ideas. To further spread their arguments they distribute literature devoted to the benefits of their service, and enlarging upon the expense, dirt, inconvenience and added responsibility which they assert accompany the privately owned power plant.

In view of the situation outlined above the author wishes to present the other side of the question in defense of the isolated plant. If the public is supplied long enough with undisputed arguments combating the efficiency of the private power plant, in the author's opinion, harm will be done to the users of power, as well as to the manufacturers of power plant apparatus, auxiliaries and supplies.

It is in order here to show the manufacturers what a hampering precedent has been established in New York City.

The Board of Fire Underwriters and the Block Lighting Plant.

The Board of Fire Underwriters and the City Department of New York rules prevent the supply of electricity from one building to another, unless both buildings belong to the same owner. The City Department says that if one building wishes to supply another it must carry its wires out to the street and then back, but as this rule applies only to plants operating under a public franchise through city streets, this ruling does not affect favorably the installation of block lighting plants. The Board of Fire Underwriters by fixing the insurance premium at a very high rate if an owner attempts to go outside of his own building to supply others, substantially prohibits the installation of block lighting plants, except where all the property in the immediate neighborhood of the plant is owned by a single owner, or a group of owners acting as one.

There does not seem to be sufficient justification for this ruling as there is no danger involved by the fact that a plant is supplying a number of buildings rather than one building, provided the work is done in accordance with the requirements of the underwriters and made entirely fireproof, as it can be readily. There is apparently no more danger in supplying five buildings belonging to different owners than in supplying five buildings belonging to one owner. So far all attempts to change this ruling have failed, and if an owner with surplus plant capacity does supply other buildings, his building will be classed as a central station and the rates raised accordingly.

Propositions to fireproof or isolate the power plant and to do the work in the most rigid accordance with the requirements of the underwriters have no effect. The underwriters say that the private owner has no right to go outside of his own plant and engage in the business of supplying electricity. They insist that if one of a group of buildings is sold, service to it from the block plant must be discontinued at once under penalty of high insurance rates. Nothing would have been changed so far as the fire hazard was concerned, no change would have to be made in the wiring, and there would apparently be no possibility of conditions tending to increase the fire hazard existing to any greater degree than existed before one of the buildings was sold.

Figuring Costs.

The cost of manufacturing electric power is not the annual operating cost plus fixed charges, divided by the number of kilowatt-hours, although this is frequently the contention of the central station solicitor. This plan is seen to be decidedly incorrect when one considers the double or treble use of coal and labor in the upkeep of equipment and building, and heating requirements of both the building and many mauufacturing processes. In fact, these items are generally taken care of by the isolated plant and its mechanics.

Obviously the heating of molds of certain stamping presses, rollers, irons or ruffling machines, the maintaining of stated high or low temperatures in rooms, or tanks, for manufacturing or storing raw materials or finished products, the uses of labor in tending elevator apparatus, trimming arc lamps, replacing incandescent lamps, making repairs to heating, plumbing and signalling systems, the repairing of roofs, the replacing of broken glass, &c., all of these would still exist and be a source of expense, and would be more bother to the factory manager if no isolated plant existed and outside help were called in for such work. It is this double and treble use of coal and labor which cannot be measured in dollars and cents easily, and which is overlooked often where no accurate cost records are kept of such work.

It being manifestly unfair to charge such items to the manufacturing cost of electricity, the following is offered as a good rule by which a perfectly just conclusion can be reached and by which the unit cost per kilowatt-hour can be compared fairly with the prices quoted by the central station:

"DEDUCT THE OPERATING AND UP-KEEP COST OF THE BUILDING'S ENTIRE MECHANICAL EQUIPMENT FROM THE OPERATING AND UP-KEEP COSTS OF THE ENTIRE MECHANICAL AND ELECTRICAL EQUIPMENT." The difference is the cost of manufacturing the electricity and dividing by the number of kilowatt-hours during such period as the cost records cover, the unit cost per kilowatt-hour is obtained.

The total cost of producing electricity is the sum of the manufacturing cost and the fixed charges, on that part of the plant devoted only to producing electricity, and not on the entire plant. It is obvious that part of the boilers and piping system would be necessary with or without the electrical generating apparatus, and interest and depreciation on them should not be charged to electricity, although the attempt is often made to do so.

Legitimate Fixed Charges.

A central station claim is that interest and depreciation are away above 10 per cent. per annum, whereas the reader probably knows of engines and boilers which are operating successfully after 20 or 25 years, while some have been operated for over 35 years. The modern dynamos and switchboards should last 15 or 20 years,

* With P. R. Moses, consulting engineer, New York.

and the steam piping as long as the building, for the most part.

Assuming 5 per cent. for interest to be correct, it can be shown how generous an allowance 5 per cent. per annum is for depreciation.

Investing the Sinking Fund.

If this amount (5 per cent.) is set aside annually and itself invested at 5 per cent. per annum, the first cost will be repaid to the owner in less than 15 years. It is claimed that a man can better invest his money in his business or in stock of merchandise than in a power plant, where it will earn 10 or even 20 per cent. per annum. Assuming it would earn 10 per cent. per annum, suppose the annual 5 per cent. sinking fund were invested in the business, then the first cost of the installation of the power plant would be refunded after the twelfth year and before the thirteenth annual payment to the sinking fund. If it will earn 20 per cent. in the manufacturer's business the installation cost will be refunded after the eighth year and before the ninth annual payment is due.

Typical First Costs Per Unit.

Before leaving the financial question, for the readers' reference are offered the following average installation costs in and about New York City, which should serve fairly well as a basis of comparison in any large city:

Table of Cost Per Kilowatt Capacity.

(Based on the experience of P. R. Moses, consulting engineer.)

	Per kilowatt plant capacity.
Boilers (erected and set in masonry) horizontal tubular	$14 to $16
Boilers, water tube	16 to 20
Steam engines:	
High speed, simple, direct connected	20 to 25
Medium speed, compound, noncond., D. C.	28 to 35
Low speed, compound, cond., belted	20 to 25
Low speed, simple, belted	25 to 30
Gas engines	50 to 60
Oil engines	75 to 85
Gas producers	15 to 20
Dynamos:	
D. C. to high speed engines	13 to 16
Belt connected to engine	12 to 15
D. C. to Corliss engine	16 to 20
Switchboard	5 to 10
Foundations	5 to 10
Steam fitting, including auxiliary apparatus, feed water heater, grease extractor, exhaust head, tanks, covering, &c.	20 to 30

Although it is argued that an individual plant must have a full duplicate boiler and power equipment to provide a reserve, it is nevertheless a fact that in small factories it is quite usual to depend upon a single generating unit, especially where repairs can be made nights and Sundays or even during the noon hour. It is absurd to always insist on duplicate and excessive equipment. But such figuring increases the fixed charges and helps one side of the argument at the expense of the other.

Rent, Insurance and Fire Hazard.

Great stress is laid upon sundry incidental costs which, it is alleged, are unavoidable accompaniments of private plant operation. Among them are rental value of space occupied, or more insurance, or increased fire hazard. Suppose a building were constructed with the intention of using electricity from the street. It would be probable, nine cases out of ten, that the competent architect would set aside a certain space which could be later used for a power plant, if it should prove expedient.

The total amount paid for insurance is generally not changed by the isolated plant installation, and the presence of competent engineers and power pumps really lowers the fire hazard, and also prevents the neglect and consequent disabling of the apparatus for fire protection. In fact, where a sprinkler system is installed the presence and operation of a high pressure plant and pump night and day will reduce insurance rates 25 per cent.

Load Conditions.

The very item of load factor (relation between average load and peak load) advanced so often as the cause of the inefficiency of isolated plant operation, has been steadily increasing to the benefit of this type of plant. The factors which have been increasing the steadiness of factory loads include such items as better light, more use of ventilating apparatus running continually, better fire protection and better sanitation (both calling for pumping), more uses for refrigeration, hot water, compressed air, or even stated degrees of humidity in the air, greater uses for transportation of men and raw and finished products, such as electric cranes and locomotives. Since the plants have been growing larger the load factor has increased and the plant efficiency has been bettered as a result.

Increased Efficiency of Apparatus and Labor.

The betterments in design both of individual apparatus and of entire plants considered as a whole, with varied applications of exhaust steam, of fuel economizers and forced draft, the improvements in engines for gas and gas producers, the wider use of low grade fuels, the increased reliance that is being placed in competent consulting engineers, and, on the other hand, the lower labor costs and repair costs which result from more simple apparatus—all these are now operating to help isolated plant efficiency. The applications of storage batteries to steady loads has frequently had a remarkable effect upon the coal bills, and, while the central station sometimes claims credit for the economies of the individual motor drive, this development also lends itself very well to the economical operation of the isolated plant. Elevator machines do not take as great a starting current as they used to do; piping work has been nearly perfected and repairs reduced to a minimum.

A large plant whose cost records have been open for the author's inspection shows what a cheapening effect a larger load will have. An increase of 100 per cent. in the amount of annual kilowatt-hours was accomplished with but 21 per cent. more fuel, when three vacant floors were rented. The reasons for the lower efficiency were that the fixed charges were too great in proportion to the output, the efficiency at small load was far below that at normal load, the stand-by losses, condensation in mains, &c., helping to increase the cost per kilowatt-hour. As soon as the plant operated under normal conditions the results were improved.

The engineering papers, trade schools, technical colleges and correspondence schools, together with a more liberal treatment of employees, are all operating to increase the intelligence of the operating engineers, and hence the efficiency of their plants. It is now recognized that cost keeping records are a necessity in the engine room, for how can one work intelligently to reduce costs if these costs are unknown, and records, reports and log books are lacking? Increase of efficiency of men, methods and apparatus have thrown the balance in favor of the isolated plant as against the central station, because it is not only putting to use much of the best central station practice, but is also developing new uses for the by-products—exhaust steam and heat and hot water—which do not exist in the central station.

Examples of Proper Cost Comparisons.

To show how the rule can be followed for figuring cost per kilowatt-hour so as to allow a fair comparison with the proposition of the central station, the following gives a few examples of the application of this rule and the conclusions to which it leads:

On a plot of ground practically 100 ft. square a 15-story office building was to be erected. The cubic contents was 1,200,000 cu. ft., and eight elevators were specified. The question confronting the owner was: "Shall we make our own current for light and power, or shall we buy it from the street, employing only enough men and buying only such coal as is needed to heat the building and keep up the mechanical equipment?" It was finally decided to install a plant of three boilers, three direct connected high speed engine-generator sets making up a 300-kw. plant, a small storage battery to equalize the rush of current caused by the electric elevators in starting, and also various necessary pumps and compressors. It was not the most economical type of plant to operate, by any means, but can be considered as a representative one, although the cost was a trifle high—*i. e.*, $43,500

for the part made necessary by the installation of this electric plant.

An important feature was the supply of steam to a restaurant in the building for cooking. The following is the year's operating expense, averaged for about 10 years:

Labor	$6,318
Water	900
Coal, 2,619 tons at $3.50	9,166
Ash removal, oil, waste, sundry supplies and lamps	1,320
Average for repairs	1,000
Total actual cost for light, heat and power	$18.704

The cost of operating such a building without an electric plant is easier to estimate than is popularly supposed, and far easier than to estimate the operating expense of the plant itself. So the assumption about to be made regarding heating, tending of elevators, and miscellaneous work about the premises has less chance for inaccuracy than if the actual figures above were to be estimated. The cost would be approximately $7500 per year for operating the heating system, coal and labor included. Subtracting this from the total actual light, heat and power cost, leaves $11,250, as the cost of electricity. The number of kilowatt-hours per annum is a matter of record, being 700,000, which makes the manufacturing cost 1.55 cents per kilowatt-hour. As before mentioned, the installation cost was $43,500 and 10 per cent. per annum for depreciation and interest, is an additional 0.62 cent. Adding this to the manufacturing cost gives 2.17 cents the cost per kilowatt-hour.

On the basis of the wholesale rates of a representative central station about 4 or 4.5 cents would be the rate paid, approximately, for 700,000 kw.-hr. Taking the cheaper rate, 4 cents, and subtracting 2.17 cents, leaves 1.83 cents saved on each unit, and this multiplied by 700,000 makes the annual saving $9810.

Example of a Factory in the East.

A reinforced concrete factory, six stories and basement, and exposed on all sides, covers about 8400 sq. ft. In addition there is an old building, part of the same factory, three stories and basement. The total cubic contents is 707,000 cu. ft., with but one electric elevator. The plant cost can be divided into mechanical and electric cost—that is, the extra investment for one boiler, engine, dynamo, switchboard, electric connections, meters and extra steam fitting, was $6900. The number of kilowatt-hours was 120,000 annually, and the entire expense for this light and power, together with heating the building, was $3788. If, however, they had purchased their electricity from the street, the expense of heating the building and supplying live steam for manufacturing would have been about $1500 per year. Thus the cost for electricity was the difference, or $2288, which amounts to 1.91 cents manufacturing cost, or 2.48 cents total cost per kilowatt-hour.

At the rate of 10,000 kw.-hr. per month this would have obtained about a 5-cent rate from a central station, so the saving made by installing the plant was 120,000 multiplied by 2.52, or over $3000 per year.

A Printing Establishment.

The owner of a newspaper in the East decided in favor of central station supply, with the following results:

Annual Costs.

Electric current for light and power for presses	$12,000
Heat, live steam and elevator pumps, being mainly coal and labor	11,000
Total operating expense	$23,000

This building is only 12 stories high, and on a rather small plot of ground, a type and size and service which could easily be supplied with an expense of $13,000 per year if a plant were installed.

A Loft Building.

A vast amount of manufacturing business in the large Eastern cities is carried on in so-called loft buildings, the lower floor being devoted to sales and show room, while the upper floors are divided between executive offices and workrooms, with electric power generally. A certain building of this character covers a lot 150 x 200 ft., and has 12 stories and two basements. There are 15 electric elevators in the building, both incandenscent and arc lighting is used, electric heating of ruffling and other irons is employed, as is also electric power for driving a quantity of sewing machines and other motors. Since the different tenants pay for their light and power by meter, it follows that very complete records are kept. After the central station service was discontinued the tenants were charged 20 per cent. less per unit for the current they used.

Besides the electricity used, there is a quantity of live steam supplied for manufacturing purposes, and the following costs include entire operating expense:

Fuel	$7,847
Labor	6,384
Oil, waste and sundries	1,314
Annual cost	$15,545

The heating and up-keep of such a building (when current was bought from the street) was about $5500, so that the electricity cost $9985 per annum, or a manufacturing cost of 2.27 cents for each of the 441,200 kw.-hr. The fixed charges being about 0.6 cent, brings the total cost to 2.87 cents per kilowatt-hour. Central station service would be at about a 4-cent average rate, or 1.13 cents more per kilowatt-hour. Thus, for 441,200 kw.-hr. the isolated plant has effected a saving of nearly $5000 a year, not counting the profit made on the sale of current to the various tenants, even with a 20 per cent. saving to them.

A Large Department Store.

One of the largest department stores in New York furnishes the following data by actual measurements and records of output and cost with an isolated plant:

Annual cost coal	$37,838.
Annual cost labor	37,800
Annual cost incidentals	4,713
Total	$80,351

If no plant had been installed the hydraulic elevators would have to be operated and looked after, the pumps, the cash system, the refrigerating plant, the escalator, the arc and incandescent lamps, the vacuum sweeper and the heating and ventilating system—all would have to be operated, involving considerable labor and coal. All that would not have to be done would be to operate the electric plant and about half the boilers. This would allow leaving off three engineers, two firemen, four coal passers, two water tenders and four oilers. The rest would still be required. Coal needed under those conditions would be about 4700 tons, and its total cost, together with labor and other expenses, would be approximately $39,230, leaving the annual cost of electricity at $41,121. For the 3,000,000 kw.-hr. the manufacturing cost figures 1.37 cents.

The plant is 2000 kw. capacity, and the cost of a precisely similar installation was $184,000, or $92 per kilowatt capacity, distributed as follows:

	Per kilowatt.
Engines and dynamos	$42
Switchboard	9
One-half of boilers	11
Steam and electric connections, auxiliary apparatus, &c.	30
Total	$92

Allowing 2½ per cent. depreciation on steam and electric piping and 5 per cent. depreciation refunding charge on the balance of the apparatus, and 5 per cent. interest on the total, the fixed charges figure up $16,500, or 0.53 cent per kilowatt-hour. Therefore, the cost of the electricity is 1.9 cents, when this charge is added to the manufacturing cost.

Assuming that a flat 3-cent rate could be had from a central station company, the annual saving would be $33,000 by the installation of the isolated plant.

Considerable other data is at the author's command covering the operating costs of clubs, hotels, apartment houses, hotel-apartment houses, &c., but he believes the above will show conclusively that, with a plant properly designed and intelligently and honestly run, the expense is much less with an isolated plant than if current alone were bought from the street, and coal and labor furnished for the heating and up-keep of the building. These items are furnished practically free in buildings containing isolated plants, because they are practically by-products of the plant operation.

THE CHICAGO IRON TRADE IN 1908.

BY T. J. WRIGHT.

Preceded by a widespread financial panic in October of the previous year, 1908 was ushered in amid forebodings, anxiety and disquieting apprehension concerning what the future might hold in store for the business interests of the country. At the beginning of the year mills and factories that less than 12 months earlier had been overcrowded with orders were, for the lack of them, brought practically to a standstill, and instead of the confidence that accompanies prosperity, there was the distrust which attends uncertainty and doubt. While in no section of the country were these conditions less marked and acute than in the Middle West, even here they were evidenced by sharp curtailment in active productive capacity, and the consequent enforced idleness of large bodies of industrial workers. With the foundations of confidence undermined progress toward recovery was slow. Wholesale cancellations of orders or suspension of specifications made the filling of mill rolling schedule very largely dependent upon current orders, which were of insufficient volume to warrant continuous operation: this condition prevailed to a greater or less extent throughout the year, and the Presidential election coming at this time complicated an already complex situation. Business does not ordinarily thrive in the best of times in the midst of a heated political campaign, and its unfavorable influence became more marked as the date of election approached; but immediately following announcement of the results a spurt of market activity took place which was widely heralded as the beginning of a permanent upward movement. The reaction that succeeded toward the end of November proved the error of this assumption, though all of the gain made in the meantime was not lost.

The greatest obstacle in the way of full resumption of normal industrial activity was the drastic retrenchment policies inaugurated by the railroads in the latter half of 1907, and which were continued with unabated vigor until near the close of 1908. The practical withdrawal of these most important iron and steel consuming interests as active buyers was far reaching in its effects, necessitating as it did an almost entire cessation of work in car shops and greatly reduced operations in other factories whose product was used directly or indirectly by the railroads. Offsetting in a measure this unfortunate development, and affording welcome support in a critical situation, was the relatively unaffected strength and prosperity of the agricultural districts tributary to the principal Western markets. Favored by abundant harvests and high prices realized for field products, the purchasing power of the rural population was not greatly impaired, and, but for the sympathetic influences which naturally induced a feeling of unusual conservatism, it is doubtful if the volume of business from such sources would have been sensibly diminished. As it was, the field and farm proved a helpful compensating balance against the unsteady equilibrium of a trying period.

The record of the year, however, has been one of intermittent advances toward permanent betterment, and though at its close the desired goal is still some distance ahead, yet a manifest spirit of hopefulness as to its early achievement is in happy contrast with the misgivings which clouded the way a year ago.

The Course of Prices.

No feature of the year's business has commanded more attention or been watched with greater interest than that involved in the efforts made to prevent widespread demoralization of prices, which is usually a concomitant result of periods of depression. It was foreseen that attempts to force goods upon an unwilling market would inevitably lead to the indiscriminate cutting of prices, and the first step taken by producers to prevent the unsettling of values was the curtailment of production. This policy was carried out with a remarkable degree of unanimity, so that, instead of piling up surplus stocks, operations were restricted to conform as closely as possible to the requirements of current consumption. Except for the voluntary co-operation of the leading interests in all lines, it is obvious that efforts directed to this end must have proved abortive, but the restricted production of both crude and finished material gives evidence of the wholesome effect of united action.

This action was supplemented by a general understanding as to prices of finished material, the uniform maintenance of which was made the subject of a number of informal conferences held during the year. Not only were the opinions and interests of producers consulted in these gatherings, but those of consumers themselves were considered. The consensus of opinion on both sides of the market seemed to be that under the then existing conditions a general lowering of prices would not stimulate buying, and would, therefore, fail of its purpose to produce a compensating increase in volume of business. An exception, however, was made of sheets, prices being reduced $1 and $2 a ton on heavy and light sheets, respectively, and $4 a ton on galvanized sheets in the first week of January. But owing to the steady decline in the price of steel making iron, which by the first of June had created a spread between it and billets of over $12 a ton, the demand for a reduction in finished material prices became insistent.

A revision of existing schedules was therefore announced in June, which included a reduction of $3 a ton on billets, $4 a ton on steel bars and $2 a ton on structural shapes. These prices continued without change through the rest of the year; but, though formally recognized by all interests, they were by no means universally maintained. At the same time a fair degree of steadiness prevailed with the result that by December values had firmed up, until with few exceptions the schedule became not only the normal but also the actual market prices.

While opinions differ as to the wisdom of the course pursued to uphold values, it is recognized that at no former time, under similar conditions, has the range of fluctuation been narrower than that of 1908.

New Plant Construction and Improvements.

With a large part of the mill, furnace and factory capacities of the Chicago District idle because of the decreased demand for their products, there was naturally small incentive for the construction of new plants or the enlarging of old ones in 1908. Many plans of this character, not a few of which contemplated the launching of new enterprises involving large expenditures, were on account of the adverse turn of financial and commercial affairs, either wholly abandoned or indefinitely postponed; but practically all of the new construction work in this vicinity, actually under way at the beginning of the year, was carried forward to completion.

A conspicuous example of such unarrested development was furnished in the steady continuance of work on the new Gary plant of the Indiana Steel Company. Step by step the work proceeded without halt, and, had there been pressing need for added steel making capacity, this plant could, at the close of the year, have taken its place among the active producers. Four of the eight blast furnaces, comprising one-half the number embraced in the plans, are ready for service, one having been blown in prior to January 1; the other four are under construction and will doubtless be finished during the present year; two of the open hearth units, of 14 furnaces each, are completed, and the foundations for the third are in, and except for the adjustment of some minor details and preliminary testing out the rail mill is practically ready to begin operation.

By the establishment at the lower extremity of Lake Michigan of these great steel works, whose final rounding out will include the installation of universal and sheared plate mills and merchant bar mills, there has been added to the manufacturing district of Chicago a new territory whose influence will be felt throughout all of the Middle West. For, aside from the importance that attaches in an industrial sense to these mills themselves,

there is not lacking convincing proof that Gary will eventually be surrounded by a chain of iron and steel working factories attracted thither by convenient transportation facilities, suitable sites and proximity to an ample supply of raw material. This result is foreshadowed by the announced intention of several large concerns to locate plants in the Calumet District adjacent to Gary, first in importance among which are the American Car & Foundry Company and the American Bridge Company. But for the untoward course of events the former of these companies would, doubtless, have begun building early in the year.

It is gratifying to note that, while no new plans for expansion were developed in 1908 by the independent mill interests, there was no hesitation in the prosecution of work on improvements under construction at the opening of the year. The aggregate tonnage involved therein was relatively small, it is true, but it represented an increase in productive capacity, for which at that time there was no present prospect of adequate employment. Comprised in the undertakings of this kind contemplated in 1908 are improvements made in the plant of the Inland Steel Company at Indiana Harbor, which included new blooming, slabbing and billet mills and the erection of a Morgan continuous bar mill of 6500 tons monthly capacity; a 14-in. merchant mill to roll steel bars and angles, built at Chicago Heights by the Calumet Steel Company, and a bar iron mill installed at Joliet by the Joliet Iron Products Company.

Labor.

Not for many years have the relations between labor and capital been as amicable and undisturbed by conflicts and controversies as was the case in 1908. Strikes and lockouts were practically unknown through this period, and such minor differences as developed were, in almost all cases, settled by informal conferences between the parties concerned. No attempt was made on the part of employers to enforce a general readjustment of wage scales, notwithstanding there was in the first half of the year especially a large surplus of unemployed labor. But the standard of efficiency was greatly raised by these conditions, so that at the same wages the cost of production was materially lessened.

In the process of selection that naturally took place when working forces were reduced, only the most efficient workmen were retained, and, freed from the hampering restrictions and exacting requirements that are often insisted upon by organized labor, operations in all departments of industry were prosecuted without the economic waste that has not infrequently been a characteristic feature of the labor problems of other years. Many workers unable to find employment in accustomed channels shifted about to other fields, which, outside of the principal manufacturing centers, were less affected by the changed conditions; and so to a considerable extent the hardships of the situation were relieved. Although the number of the unemployed was at the close of the year much reduced, this unfortunate phase of the depression was not wholly eliminated.

Buildings.

In striking contrast to the depression which to a greater or less extent affected business in other lines is the phenomenal record of building construction, as exhibited in the permits issued by the city of Chicago. The results thus shown indicate an expenditure of $68,694,765, which exceeds by $5,231,365 the previous record of 1892, when under the building stimulus created by preparations for the World's Fair of the following year an aggregate of $63,463,400 was reached. While this year's totals have been swelled considerably by a few projects of unusual size, an analysis of the whole furnishes unmistakable evidence of a large increase in small buildings. This is attributable in a large measure to the general distrust of the various forms of commercial investments to which the financial panic of the preceding year gave rise. Realty investments were turned to by the masses as affording safest the channel for the employment of capital, and large sums that under ordinary conditions would have been invested in industrial enterprises were thus diverted in this direction.

Among the structures of notable size entering into and forming part of this record, and for which 65,000 tons of structural steel was required, are the new plant building of the Corn Products Company, the La Salle Hotel, the Chicago Musical College, the Blackstone Hotel, the People's Gas Light & Coke Company's office building, the Chicago & Northwestern depot and approaches and the new City Hall. Active work on all of these structures is now under way or about ready to begin.

A review of the results accomplished in new factory construction only serves to emphasize the marked effects of the reactive influence which has so seriously retarded the progressive development of business throughout the year. The energies of manufacturers were chiefly bent upon the securing of a sufficient volume of business to employ even a fair portion of the facilities they already possessed, and under such circumstances little consideration was, for the time being, given to further expansion. An exception to the general rule in this respect is noted in the plans which were put into execution by the Western Electric Company for additions to its plant at Hawthorne; these when completed will centralize the main portion of the company's work at that place, and will provide facilities for a largely increased output.

Pig Iron.

From a maximum rate of 27,000,000 tons annually only three months earlier, pig iron production on January 1, 1908, had dropped to a rate of 12,000,000 tons. Notwithstanding the fact that more than half the blast furnace capacities of this district was out for the greater part of the year, consumptive demands were easily and promptly met. In a few cases even this curtailment of production did not suffice to prevent a moderate accumulation of stocks in furnace yards, but these were practically all absorbed by an increased demand which developed in the last quarter.

Responding to the unrestricted effects of supply and demand, prices declined steadily on Northern iron, until near the end of October. At the outset there was a spread of 50 cents to $1 a ton between Northern and Southern iron in favor of the former, but this was reversed in the last half, when for a time a spread of $1 favored the Southern product. This inequality disappeared in December, when both reached an even level. The low point of the year was reached by the Southern interests in May, when a large amount of tonnage was placed at around $11, Birmingham, for No. 2 foundry. Immediately thereafter prices reacted, and, with the exception of a slight recession in July, the course was steadily upward until the close of the year, at which time $13, Birmingham, represented the inside figure, both for present and forward deliveries.

Deliveries on much of the iron contracted for in the last half of 1907 for shipment through the first half of 1908 were held up at the request of buyers, but little of it was canceled outright. The active Northern merchant furnace capacity was increased in the last quarter of the year by the blowing in of three stacks, one by the Zenith Furnace Company at Duluth, one by the Northwestern Iron Company at Mayville, Wis., and one by the Thomas Iron Company at Milwaukee, Wis. But with no overhanging stocks to menace the market and a gradually increasing consumption, the outlook is now regarded as distinctly encouraging.

Scrap Prices.

From the low point reached after the steady decline of the previous year, prices of old material rallied slightly in February, from which time there was a progressive decline until June, when the extreme recession recorded for the year was reached. Through the last half of the year there was a progressive advance, which in December brought values up to the highest level of the year. No. 1 railroad wrought, which in May sold for $10.75, was bringing $15 in December. Heavy melting steel recorded a net advance of over $5 a ton above the lowest price of the year, and rerolling steel rails were in good demand, the supply at no time being in excess of market requirements. The fluctuations in cast scrap was less marked, the extreme spread in the average monthly quotations being less than $2.50 a ton.

Confident of the ultimate ascendency of old material values, the leading dealers began to accumulate large quantities of stock on the low prices ruling from January to June. These holdings constituted no menace to the market, since they were in strong hands and were being held for substantial profits. Anticipation of the large tonnage of melting steel that will be required by the Gary mills when they commence operations was a prominent factor operating in the support of prices during the last three months of the year. Not overlooking the possible effect of the probable purchases of this interest of considerable scrap in the outside markets, the holders of yarded scrap have been all the more confirmed in their position, and it is estimated that there are between 175,000 and 200,000 tons in scrap yards in the vicinity of Chicago.

The Outlook.

In the forward view of things there is nothing that seems to warrant the expectation of swift expansion, but, on the other hand, there are good grounds for the widely entertained hope of a gradual healthy growth in business through 1909. Money is now easy and available for all legitimate enterprises. Manufacturers as a rule have their business well in hand, and both jobbers and retailers are equally fortified to enter the campaign of the new year. The lessons learned through the experiences of the recent past are still fresh enough in mind to be heeded as a warning against extravagance and overreaching ambition. The enormous revenues derived from crops give assurance of heavy consumption by the agricultural interests, and all that is needed to round out a normal volume of business is a revival of activities in railroad work. While it is true that the way has not been wholly cleared of doubtful elements, yet there is reassurance in the fact that as far as can be seen the obstacles ahead are insignificant in comparison with those that have been overcome.

Tables of Prices.

Following are tables showing the course of prices monthly in 1908, and yearly averages for 10 preceding years, on leading iron and steel products:

Average Chicago Prices of Pig Iron, 1908.

Month.	Northern coke No. 2.	Superior charcoal.	Southern coke No. 2.
January	$18.10	$22.50	$17.45
February	17.81	21.38	17.35
March	17.50	21.25	17.10
April	17.38	20.30	16.35
May	17.28	20.00	15.98
June	17.37	20.00	16.35
July	17.20	20.00	16.10
August	17.00	19.50	16.35
September	16.75	19.50	16.85
October	16.50	19.50	16.85
November	17.25	19.50	17.10
December	17.00	19.50	17.35
Average for year	$17.26 1/6	$20.24 5/12	$16.76 1/2
Average for 1907	$24.18 1/6	$26.56	$24.47 1/8
Average for 1906	20.15	20.72	19.44 3/4
Average for 1905	17.30 1/4	17.99 3/4	16.66 1/2
Average for 1904	14.04 3/4	15.50	13.92 1/2
Average for 1903	18.88 1/2	22.13 1/4	18.31 1/4
Average for 1902	20.50	23.50	20.10
Average for 1901	15.00	17.50	14.60
Average for 1900	19.12 1/2	22.00	18.35
Average for 1899	17.65	19.80	17.75
Average for 1898	11.00	11.60	10.45

Average Chicago Base Prices of Finished Iron and Steel, 1908.

Month.	Common bar iron. Cents.	Soft steel bars. Cents.	Structural shapes. Cents.	Smooth machinery steel. Cents.
January	1.59	1.78	1.88	2.18
February	1.65	1.78	1.88	2.18
March	1.65	1.78	1.88	2.18
April	1.65	1.78	1.88	2.18
May	1.65	1.78	1.88	2.18
June	1.50	1.58	1.78	2.12
July	1.50	1.58	1.78	2.08
August	1.50	1.58	1.78	2.08
September	1.50	1.58	1.78	2.08
October	1.50	1.58	1.78	2.08
November	1.50	1.58	1.78	2.08
December	1.50	1.58	1.78	2.08
Average for year	1.55 3/4	1.66 1/3	1.82 1/8	2.12 1/2
Average for 1907	1.78 1/2	1.77 1/3	1.87 1/8	2.16 1/8
Average for 1906	1.71 1/4	1.67 3/4	1.86 1/2	1.92 1/3
Average for 1905	1.64 3/4	1.64 2/3	1.78 1/3	1.89 3/4
Average for 1904	1.41 1/4	1.49 1/2	1.70 3/4	1.74 1/4
Average for 1903	1.64 3/4	1.72	1.75	1.97 1/4
Average for 1902	1.71	1.73 1/2	1.75	2.00
Average for 1901	1.58	1.58	1.70	1.96
Average for 1900	1.75	1.75	2.00	2.25
Average for 1899	1.80	1.90	2.00	2.50
Average for 1898	1.05	1.10	1.25	1.55

Average Chicago Prices of Old Material, 1908.

Month.	Old iron rails. Gr. ton. $	No. 1 railroad wrought. Net ton. $	No. 1 busheling scrap. Net ton. $	Heavy cast scrap. Net ton. $	Heavy melting scrap. Gr. ton. $
January	15.60	11.20	7.60	12.95	11.05
February	17.12	12.44	8.00	13.00	12.50
March	15.44	11.25	7.38	12.12	11.44
April	15.00	11.00	7.00	12.05	11.05
May	14.81	10.75	6.94	11.50	10.62
June	15.50	11.69	6.88	12.00	11.62
July	15.90	12.15	7.25	12.15	11.75
August	16.56	12.69	7.62	12.75	12.88
September	17.35	13.44	8.06	12.88	13.00
October	18.00	13.60	8.20	13.25	13.45
November	18.38	14.38	8.63	13.75	14.88
December	19.50	14.83	9.33	13.92	15.17
Average for year	16.59 11/12	12.45 1/6	7.74 1/2	12.69 1/3	12.45 1/12
Average for 1907	22.46 3/4	14.63 1/2	10.55 1/2	17.26 1/2	15.08
Average for 1906	23.04	15.62	10.69	14.55	14.74
Average for 1905	20.18	16.14 1/2	11.11 3/4	13.49 1/2	13.96 1/2
Average for 1904	16.56 1/4	12.45	8.76 1/2	10.95 1/2	10.72
Average for 1903	20.28 3/4	16.07	12.05	14.74 1/2	15.50 1/2
Average for 1902	23.91	19.68 1/2	13.81 1/2	15.03	17.37 1/2
Average for 1901	19.50	15.00	10.80	11.25	....
Average for 1900	17.90	15.00	8.00	11.00	....
Average for 1899	21.00	17.25	10.15	12.40	....
Average for 1898	12.37 1/2	11.25	6.62 1/2	8.15	....

THE PHILADELPHIA IRON TRADE IN 1908.

BY A. A. MILLER.

Without doubt the year just closed was one of the most trying the Philadelphia iron and steel trades have known. Conditions at times bordered on demoralization, and only the most delicate handling enabled the trade to pass the danger points which were frequently encountered. Unsettled financial conditions and general business depression, which were the aftermath of the panic of 1907, the usual uncertainty of a Presidential election year, and, finally, the question of the readjustment of the tariff were the foremost general factors.

While the curtailment in production in the closing months of last year was sharp, a more marked recession was to be noted during the early part of 1908. The year opened with the hope that business would rapidly recover, but expectations were not realized. Financial conditions improved as the year advanced, but the feeling of confidence necessary for the successful conduct of business was lacking almost throughout the year. The acute stringency of the fall of 1907 had passed, and money at length became plentiful, but those having large amounts at their command hesitated for a number of reasons when it came to putting funds into industrial undertakings. While conditions in the trade during the early months of the year were better on the whole, curtailments, which had been made during the closing months of 1907, were not sufficient to bring production on a parity with consumption and readjustments were found necessary in many instances to keep the trade on an even keel. Efforts of the producers of pig iron in the East were probably more successful than in any other section. Meetings frequently held under the auspices of Judge Gary of the Steel Corporation, brought producers from all sections together, resulting in a better feeling and serving for quite a time as a balance wheel for the

whole trade. Ruinous price cutting was avoided, and, while producers who considered themselves on the outside made marked concessions from time to time, which were ultimately met by those who had held consistently together, it was with a unanimity heretofore unknown in the trade that such action was taken.

The Course of Prices.

It was a serious question which was the better method to adopt in regard to prices. Consumers held off hoping for a material reduction in both pig iron and finishing materials; but with the cost of production in many cases close to the selling prices, producers were not inclined to make reductions that would mean the operation of their furnaces and finishing plants at a loss. Early in April, however, the reduction in prices became an admitted contingency, but it was decided by the leading producers that no action be taken except after consultation by the leading interests of the country. Many makers of finished materials, even at that date, and, as was subsequently shown, for a long period beyond, were using raw materials purchased in the previous year at very much higher prices than those prevailing at any time during the past year. In May indications that continued co-operation between makers of pig iron could not be maintained were apparent, and it was evident that prices must be made sufficiently low to enable producers to market their product, which in the East had accumulated to a considerable extent. The Southern producers particularly could not be brought into accord and sellers in that section for a time dominated the market; and when the break came, somewhat later in the month, the firm manner in which the situation had been handled since the first of the year prevented any disastrous price war. Moreover, as the demand gradually increased prices were slowly worked upward, so that at the close of the year they were in many cases very close to those prevailing on January 1, 1908.

In the semifinished and finished material lines production increased throughout the year. Frequent recessions were encountered, but subsequent gains resulted in a slow, irregular improvement. Production early in the year was approximately on a basis of one-third of normal capacity (some, indeed, being as low as 20 per cent. at times), but toward mid year signs of a turn for the better were to be noted and the last half developed a fairly steady forward movement. But even during this portion of the year trade was held up to some extent, particularly in view of the Presidential election. In the fall the result was discounted to some extent and just before and after the election quite a volume of business was placed.

The policy of practically all of the railroads throughout the year was one of extreme conservatism. Purchases have been largely confined to actual necessities, and while there was a forward movement in the buying of rails, locomotives and rolling stock toward the close of the year, the demand was very irregular. It is doubtful if any stable resumption will be noted in the trade until after the railroads again become buyers on a more normal basis.

While delayed deliveries and the scarcity of pig iron in 1907, particularly steel making irons, led consumers to consider seriously the building or acquiring of blast furnaces for their own use, but one move in that direction is to be noted in this territory in the past year. Worth Brothers Company, Coatesville, Pa., one of the large Eastern makers of steel plates, started the erection of a large stack at its own plant. The general depression, the plentiful supply and low price of basic iron during the past year have resulted in other propositions of this sort being held in abeyance.

Pig Iron Production.

The output of pig iron in the past year showed a very marked falling off from that of the previous year. The total of coke and anthracite pig for 1908 may be estimated as close to 15,650,000 tons, the actual December output not yet being available, showing a decline of about 9,700,000 tons when compared with that of 1907, when the output of coke and anthracite iron reached the record figure of 25,343,964 tons. The sharp curtailment which began in November, 1907, was not checked until the following March, when the largest output for any month in the first half of the year was made, this being due to an increase in the production of the steel works' furnaces. However, there was a decline in the following month, after which production continued to call off until July, following which there was a steady upward movement throughout the remainder of the year. January and June showed but a small variation in production, that of the former being 1,045,525 tons and of the latter 1,088,634 tons. In November the output was 1,577,854 gross tons, a gain of about 44 per cent. from June.

The exact relation of supply and demand at the end of the year is not known, owing to the lack of information regarding stocks on the furnace banks in the different sections of the country. It is evident from the available data that merchant furnaces have increased their output since June much more rapidly than have the steel works furnaces. It is also generally known that the melt has increased, while it is believed that consumers are carrying larger stocks of iron in their yards than they did earlier in the year. As a guide to the situation in this territory, however, we are able to note that records of the Eastern Pig Iron Association, representing 44 furnaces, with a monthly capacity of 195,000 tons, show that twice as many furnaces were in blast in November as were operating in February, and that the production at the close of the year represented about two-thirds of the total capacity. Stocks on the yards of these furnaces increased early in the year and were the highest in May. A moderate decline was to be noted in June, after which month they fell off steadily, until in December they represented less than a week's supply at the full capacity rate, or but a few days' supply based on the current rate of production during that month. As stocks declined an increase in orders was naturally to be noted. The lowest level was in May, business in that month being about 10 per cent. less than that in January. A sharp upward movement was noted in June and then the increase was steady until in December the volume of business transacted was nearly two and a half times that at the beginning of the year.

The Pig Iron Market.

The variations which marked prices in 1907 were much reduced during the past year, the full range on all grades being but a few dollars a ton. The highest point was at the beginning of the year, the lowest in mid-year, while in the second half there was a gradual advance, and at the close of the year prices were within 50 cents to $1 of those prevailing in January. Early in the year consumers, owing to the generally depressed conditions of business, purchased only for immediate needs, feeling their way from month to month, taking iron for future deliveries only when orders in hand warranted such buying. Later in the year there was a greater tendency to purchase for extended delivery, but sellers at that time pretty generally refused to accept much forward business at the prevailing prices. The market almost throughout the year has been of a waiting character, both buyer and seller proceeding cautiously, keenly watching conditions and transacting business along most conservative lines.

The stability of prices during the first half of the year, when consumption was at the low water mark, was to be particularly noted. The greater proportion of producers in this district reduced their output to a minimum and for long periods at a time prices were maintained on an even basis, notwithstanding continual underselling on the part of a few outside interests, which at times entered this field quite extensively. In some cases these prices were down to actual cost, in instances reported even below cost; but as nearly all producers still had heavy orders at the high prices which prevailed before the panic of the previous fall, they were able to even up to some extent, and the tonnage taken enabled them to maintain their furnaces in continuous operation. The ruling price for standard No. 2 X foundry, $18.25, delivered, was firm-

ly held in this territory by the majority of producers from early in January until the middle of April. About that time some sellers whose stocks had been accumulating rapidly began to meet the quotations of the outside sellers. In May Southern No. 2 foundry was quoted at $11.50, Birmingham, equal to $15.50 to $16.50, delivered, according to point of destination, in Eastern territory, while eastern Pennsylvania irons of the same grade had been maintained at $18.25, with certain interests cutting to $17.25, delivered. In May a cut to $16.75 for standard eastern Pennsylvania No. 2 X foundry was made by a number of sellers. Some few, however, maintained the price at $17.25, which they contended was actual cost. Not much buying resulted and during the following month a further recession of 25 to 50 cents a ton was noted. In July, August and September prices of No. 2 X foundry held fairly even, ranging from $16.50 to $17 for either prompt or three months' delivery. In October a forward movement began; buyers became more interested in the market, and prices gradually stiffened on moderate buying, largely for the last quarter. Toward the close of the year quite a number of producers withdrew from the market, refusing firm offers for second quarter deliveries, even at an advance over quotations for the first three months of the year, which at the close of December ranged from $17.25 to $17.50, delivered, for standard brands of eastern Pennsylvania No. 2 X foundry iron.

Prices on the other grades of pig iron followed largely the general course of the foundry grades. Standard gray forge iron was not in very active demand owing to the continued irregularity of the rolling mills throughout the year. In January it was quoted at $16.25 to $16.75 delivered in this territory, which price was fairly well maintained until along in May, when it was reduced to $15 to $15.50. Here it held pretty steadily throughout the summer months. Beginning with September there was an increased demand and quotations showed a gradual advance at the close of the year, being close to $16.50, delivered.

Steel makers, who in almost every case had carried over high priced iron bought in 1907, were rather irregular buyers and seldom bought for extended delivery. Basic iron, which was held at $17.50 for prompt shipment in December, 1907, sold down to $16.50, delivered, in January. In February higher prices were asked, and in March and April the market held at $17.25, delivered, but receded in June to $15 to $15.50, which range also prevailed during July and August. The forward movement in basic iron started in September, when there was considerable buying for the balance of the year at $15.25 to $16; afterward on heavier buying for the balance of the year and first quarter of 1908 delivery prices advanced to $17, being fairly well maintained at that figure until the close of the year. The same price then ruled for first half shipments. Low phosphorus pig showed a wider range in prices than any other grade. At the beginning of the year it was held at $24.50 to $25, declining slowly in the first half to $21. In July and August prices were comparatively steady, but in September came a recession of $1 a ton. In October an upward tendency was shown, and November quotations ranged from $20.50 to $21.50, while at the close of the year the ruling quotation was $21.50 to $21.75, delivered.

The following table shows the high and low range of prices for the principal grades for each month of the year, based on delivery in buyers' yards, eastern Pennsylvania and near-by territory:

Prices of Pig Iron at Philadelphia in 1908.

	January.		February.		March.	
	Low.	High.	Low.	High.	Low.	High.
	$	$	$	$	$	$
Pa. No. 2 X foundry..	18.00	18.50	18.25	18.50	17.75	18.50
Standard gray forge.	16.25	16.75	16.50	16.75	16.50	16.75
Basic	16.50	17.25	....	17.25	....	17.25
Low phosphorus.....	24.50	25.00	24.00	25.00	23.50	24.50
	April.		May.		June.	
	Low.	High.	Low.	High.	Low.	High.
	$	$	$	$	$	$
Pa. No. 2 X foundry..	17.50	18.25	16.75	17.25	16.50	17.25
Standard gray forge..	16.00	16.75	15.25	16.75	15.00	15.50
Basic	....	17.25	16.00	17.25	15.25	16.25
Low Phosphorus.....	23.50	24.00	21.00	23.50	21.00	21.25
	July.		August.		September.	
	Low.	High.	Low.	High.	Low.	High.
	$	$	$	$	$	$
Pa. No. 2 X foundry..	16.50	17.00	16.50	17.00	16.50	17.00
Va. No. 2 X foundry.		17.00	17.00	17.25	....	17.00
Standard gray forge..	15.00	15.50	15.00	15.50	15.25	15.75
Basic	15.00	15.50	15.00	15.25	15.25	16.00
Low phosphorus.....	21.00	21.25	21.00	21.50	20.00	21.00
	October.		November.		December.	
	Low.	High.	Low.	High.	Low.	High.
	$	$	$	$	$	$
Pa. No. 2 X foundry..	16.75	17.00	16.75	17.50	17.25	17.50
Va. No. 2 X foundry..		17.00	17.00	17.50	17.25	17.75
Standard gray forge..	15.50	15.75	15.50	16.00	15.75	16.50
Basic	15.50	16.00	16.00	17.00	16.50	17.00
Low phosphorus.....	20.00	20.50	20.50	21.50	21.00	21.75

Ferromanganese.

The market was dull and buying was irregular, although prices did not show as wide a range as in 1907. Sales were the lightest during the first half, as consumers carried over both stocks and contracts from the year before. During January 80 per cent. ferromanganese was quoted at $48 to $49, Baltimore, with the market extremely quiet. In April the lowest price for the first half of the year, $42.50, Baltimore, was recorded. The bulk of the buying during the early months of the year was for prompt shipment. In May and June, however, a moderate forward movement began, and while prompt ferro could be had at $43, Baltimore, deliveries for the second half commanded $46, Baltimore. In September the lowest prices for prompt shipment in the second half were noted, sales for such delivery being made at $42.50, Baltimore. On moderate buying prices stiffened again during the last quarter, when some little business for delivery during the first half of 1909 was transacted at prices ranging from $43.50 to $44.50, Baltimore. At the close of the year prices were stronger, quotations ranging from $45 to $45.50 for prompt, and $46 to $47, Baltimore, for deliveries during the first half of the year.

Steel Billets.

The demand for steel in 1908 was comparatively light, and mills in this territory operated at greatly reduced capacities. At times during the first half of the year plants were temporarily shut down, and at other times crept along at an average of about 20 per cent. of capacity. After midyear an improvement was seen. Forging billets particularly were quite active at times and mills for the most part were able to continue in somewhat irregular operation, varying from 30 to 50 per cent. of capacity, although at no time did the mills have much forward business on their books. Toward the close of the year buyers showed a disposition to contract for the first half of the next year, but found few makers willing to accept such business at ruling prices, which were the lowest of the year. In the early months of the year prices for ordinary rolling steel for delivery in this territory ranged from $30 to $31, with forging billets at $33 to $35. Early in the spring a uniform price was made, taking the Pittsburgh base, $28 a ton, plus the freight, making the price for delivery in this territory $30.40 for ordinary rolling steel, with forging steel at $2 advance. This basis held for some time, when further efforts to stimulate buying were made by makers agreeing to halve the freight rate, making the local quotation $29.20 and $31.20, respectively. This did not bring the desired result, and in June a further reduction of $3 a ton was made in the base price, the half freight allowance being maintained, bringing quotations for ordinary rolling steel to $26.20, delivered in this territory, with forging steel $28.20, subject to the usual extras for high carbons and special sizes. This basis continued throughout the second half of the year.

Plates.

Plate makers entered the year with mills running at about half capacity, and were able to maintain pretty close to that average throughout the year. At times in the first half they fell off to about 30 per cent., but in the second half production as a rule was above the 50 per cent. mark and some plants ran in November and December at 70 to 80 per cent. of capacity. Large tonnages were few and far between. Some fair lots for structural work, boats, water pipe and car work were before the trade at times, but business was mostly of a miscellaneous

character. July and August were comparatively good months; in some instances the best the mills had had since October, 1907. In November a decided betterment was noted and several mills received orders which just about equaled their normal capacities. December was hardly up to November; this is usual, however, owing to the closing of the year.

The established price, 1.85 to 1.90 cents, for deliveries in this territory was maintained during the first four months of the year. Possibilities of reductions held up business in April and May, and secret cutting was reported in some directions. Early in June a slight reduction was made, placing quotations at 1.75 to 1.80 cents for deliveries in this vicinity. This basis was maintained with comparative firmness throughout the remainder of the year.

Structural Material.

Manufacturers were not busy, yet they were able to maintain a rate of production ranging between 40 and 60 per cent. of capacity almost continuously throughout the year. In this territory the absence of large propositions was noteworthy last year. Several fair orders resulted from the elevation of the Philadelphia & Reading tracks in this city, but there were few contracts of any size in the building lines. In September the contracts for the second half of the Wanamaker store, some 15,000 tons of material came out, this being the largest business in this territory. Both mills and fabricators have been reaching out to a considerable extent and some satisfactory contracts from distant points were booked. The smaller fabricators made quotations at times materially lower than were possible on the basis of regular mill prices. During the last half of the year a better demand for struuctural material was to be noted, steel car orders furnishing some good tonnages. The Bethlehem Steel Company, with its new Saucon plant in full operation on heavy sections, benefited materially by this business and also secured the adoption of its shapes for a number of buildings let last year. In June, when the general readjustment of finished material prices took place, the price of structural material was reduced $2 a ton, and quotations for delivery in this territory, which from January to June were 1.85 to 2 cents, according to specifications, were reduced to 1.75 to 1.90 cents. At this basis they were pretty firmly maintained throughout the balance of the year, although some fabricators were able to figure lower on completed work than were fabricators with mill connections.

Sheets.

No more consistent gain has been shown in any other line of finished materials throughout the year. In January mills were operating at 35 to 40 per cent. of capacity, but business increased steadily as the year advanced. For some time previous to 1908 the following basis for mill shipment had been firmly held, with the usual extras for small lots: Nos. 18 to 20, 2.50 cents; Nos. 22 to 24, 2.70 cents; Nos. 25 and 26, 2.80 cents; No. 27, 2.90 cents; No. 28, 3 cents. This range of quotations was reduced in January on all gauges except Nos. 18 to 20, which remained at 2.50 cents, the other sizes being quoted as follows: Nos. 22 to 24, 2.60 cents; Nos. 25 and 26, 2.70 cents; No. 27, 2.80 cents; No. 28, 2.90 cents, with the usual extras for small lots, which prices were held throughout the remainder of the year. While consumers continued to take tonnage freely, orders until late in the year were almost entirely for prompt shipment. During November and December 90 to 95 per cent. of the normal sheet mill capacity was averaged in some instances. toward the close of the year buyers showed more disposition to take forward tonnage and quite a few contracts for deliveries extending over the first half of 1909 were made.

Bars.

A most unsettled market has characterized the bar iron trade almost throughout the year. Makers in the East were apparently unable to agree on any price basis and maintain it for any length of time, and frequently the market was wide open. Mills on the whole have had an unsatisfactory year. Some have been idle for long periods at a time, others operated more regularly on a materially reduced basis, while still others ran intermittently. On an average, it has been stated, 40 per cent. about represents the production of a majority of the mills during the past year, some few probably averaging about 60 per cent. Quotations early in January for delivery in this territory were 1.75 cents, but there was some sharp cutting. Later in the month the Eastern Bar Iron Association decided that low prices made by some mills should be met. The leading mills did not go below 1.47 cents for refined, while common bars were to be had as low as 1.25 cents, delivered. Consumers refused to buy heavily on a declining market, and in February 1.65 cents, delivered in this territory was named, the association members withdrawing all lower quotations. In the meantime consumers and merchants had placed heavy orders at the low range of prices, and in March and April makers who attempted to hold the established basis did very little business, orders going to merchants and dealers who had bought at the low level and who sold down to 1.40 cents, delivered. In June the Western Bar Iron Association reduced the base price of bars at Pittsburgh, and efforts made to meet the price in the East failed. The Eastern Association adjurned without fixing any price, and the market has virtually been an open one during the entire second half of the year. In June and July prices again declined steadily from 1.50 cents down to 1.30 cents, delivered, some mills taking orders pretty freely at 1.35 to 1.45 cents. In August there was a slight stiffening in prices to 1.40 to 1.45 cents, and as pig iron and old material advanced during the last quarter of the year makers were compelled gradually to advance their prices. By December quotations were around 1.47 to 1.55 cents, with some mills asking 1.60 cents for refined iron bars, while the average price at the close of the year was 1.52 to 1.60 cents, delivered, in this territory.

Coke.

Early in the year foundry coke commanded $2.50 to $3 per ton at oven, with furnace coke $2.25 to $2.50, at oven, but with the falling off in consumption the price declined, notwithstanding the reduction of output at the ovens. In June prices for foundry coke ranged from $2.15 to $2.50, with furnace coke $1.50 to $1.75 at oven. As the demand improved later in the year quotations advanced, November showing about 25 cents a ton increase over midsummer prices, while in the middle of December foundry coke was quoted $2.30 to $2.60, at oven, with furnace coke $1.90 to $2.10. At times stock coke for immediate shipment could be had 50 cents a ton cheaper than coke direct from ovens. The drought in the early fall months resulted in a further curtailment in production and was one of the factors in stiffening prices. No serious shortage resulted, however. Few contracts of any size were made last year, consumers preferring under the existing conditions to purchase for moderate deliveries only until later in the year, when business showed an upward tendency, but then sellers were not so freely inclined to accept forward business at ruling quotations. We quote below the monthly high and low prices for delivery in this territory.

Prices of Coke at Philadelphia in 1908.

	January.		February.		March.	
	High.	Low.	High.	Low.	High.	Low.
Connellsville furnace.	$4.65	$4.05	$4.50	$4.00	$4.50	$4.00
Connellsville foundry.	5.15	4.65	5.00	4.50	5.00	4.45
Mountain furnace....	4.25	3.75	4.10	3.70	4.10	3.60
Mountain foundry....	4.85	4.35	4.60	4.10	4.60	4.10
	April.		May.		June.	
	High.	Low.	High.	Low.	High.	Low.
Connellsville furnace.	$4.25	$3.80	$4.00	$3.75	$3.90	$3.60
Connellsville foundry.	4.70	4.30	4.55	4.30	4.60	4.30
Mountain furnace....	3.85	3.40	3.60	3.35	3.50	3.25
Mountain foundry....	4.10	3.80	4.10	3.90	4.20	3.90
	July.		August.		September.	
	High.	Low.	High.	Low	High.	Low.
Connellsville furnace.	$3.90	$3.60	$3.90	$3.60	$3.90	$3.60
Connellsville foundry.	4.50	4.30	4.50	4.30	4.50	4.15
Mountain furnace....	3.50	3.25	3.50	3.25	3.50	3.25
Mountain foundry....	4.10	3.90	4.10	3.90	4.10	3.75
	October.		November.		December.	
	High.	Low.	High.	Low.	High.	Low.
Connellsville furnace.	$3.90	$3.65	$4.00	$3.65	$4.10	$3.85
Connellsville foundry.	4.40	4.15	4.50	4.15	4.50	4.20
Mountain furnace....	3.50	3.25	3.60	3.25	3.75	3.45
Mountain foundry....	4.00	3.75	4.10	3.75	4.10	3.80

Old Material.

The demand, owing to the restricted and irregular operation of both iron and steel mills, has been far below the normal, but no extraordinary supply of old materials developed owing to the decreased activity of the railroads and the small production of waste materials owing to decreased general manufacturing. A scarcity in some grades prevailed at times, which enabled those holding scrap for speculation to control the situation more readily and gradually force up prices. A good portion of the supply of the various grades of old material, used more particularly for steel making purposes, has been held in comparatively strong hands throughout the year, and there has been but little business transacted on an extended forward delivery basis. The railroads as well as the merchants added materially at times in advancing prices, and for several months little scrap on the regular monthly railroad lists was disposed of. The low point in the price of No. 1 heavy melting steel was in January, when quotations were from $11.50 to $12, delivered. A fairly steady advance followed which was most pronounced near the close of the year, when $17 to $18 represented the market. The steel mills through their purchasing agents made some effort to hold back the advance, naming from time to time the maximum price they were willing to pay, usually from 50 cents to $1 under the market, and while they were able to pick up moderate amounts here and there at prices determined upon, they were for the most part compelled gradually to move up their prices to keep pace with the market.

In January business was extremely dull, but a buying movement in February advanced the price of No. 1 steel to $15.50. A slight recession followed, prices in March, April and May averaging from $12.75 to $13.75. A slight upward movement developed during the next three months, and as high as $15 was paid. Beginning with August, when conditions generally showed betterment, the price of No. 1 steel gradually advanced to $17.75, delivered, at the close of the year, mostly on comparatively small sales. The most important transaction was early in December, when 25,000 tons for three months' delivery was sold at an average price representing the highest paid for this grade in the year. The various other grades of old material, with the exception of some few specialties, followed closely the market for heavy melting steel. At times the movement was regular, while at others the changes were more pronounced. Choice No. 1 railroad wrought did not vary greatly in price throughout the first half, but advanced steadily from $15 in June to $20.50 in December. The range of quotations, showing the highest and lowest prices per gross ton of the leading grades of old material delivered in buyers' yards in this territory for each month of the year, was as follows:

Prices of Old Material at Philadelphia in 1908.

	January.		February.		March.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$12.50	$11.50	$15.50	$13.50	$14.50	$12.75
Low phosphorus	18.50	16.00	19.00	18.00	19.00	17.00
Old iron rails	18.00	16.50	19.00	17.50	19.00	17.00
Old car wheels	20.00	17.00	17.50	16.00	18.00	14.00
Choice No. 1 R. R. wrought	15.50	14.00	17.00	15.00	16.25	15.00
Machinery cast	16.00	15.00	15.50	15.00	15.50	15.00
Wrought iron pipe	13.00	11.50	12.50	11.50	12.50	11.50
Wrought turnings	9.50	9.00	10.50	9.00	10.25	9.50
Stove plate	13.00	12.50	13.75	12.50	13.50	12.00
Cast borings	7.50	7.00	9.00	8.00	8.75	7.50

	April.		May.		June.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$13.25	$12.75	$15.50	$12.75	$14.00	$13.00
Low phosphorus	18.00	17.50	18.00	17.50	18.50	17.50
Old iron rails	18.00	17.00	18.50	17.00	18.50	18.00
Old car wheels	15.00	14.00	15.00	14.00	15.00	13.50
Choice No. 1 R. R. wrought	15.50	15.00	15.50	15.00	16.00	15.00
Machinery cast	15.50	15.00	15.50	14.50	15.00	14.00
Wrought iron pipe	12.00	11.50	12.00	11.50	12.50	11.50
Wrought turnings	9.25	8.75	10.00	8.75	10.00	9.50
Stove plate	11.50	11.00	11.50	11.00	11.50	11.00
Cast borings	8.00	7.50	9.00	7.75	9.50	8.50

	July.		August.		September.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$14.50	$13.50	$15.00	$14.50	$15.75	$15.00
Low phosphorus	18.50	18.00	18.50	18.00	19.00	18.50
Old iron rails	18.50	18.00	20.50	18.00	21.00	20.00
Old car wheels	14.00	13.50	15.50	14.50	15.50	15.00
Choice No. 1 R. R. wrought	17.00	15.00	18.25	17.00	18.75	18.25
Machinery cast	14.50	14.00	15.00	14.00	15.75	15.25
Wrought iron pipe	13.00	12.00	14.00	13.50	14.75	14.00
Wrought turnings	10.50	9.50	11.50	10.50	12.00	11.50
Stove plate	12.00	11.00	13.50	12.00	13.50	13.00
Cast borings	9.50	9.00	10.75	9.50	11.75	10.75

	October.		November.		December.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$15.50	$15.00	$17.00	$15.25	$17.75	$16.25
Low phosphorus	19.00	18.50	19.25	18.50	20.50	18.75
Old iron rails	21.00	19.50	21.00	19.75	21.75	21.00
Old car wheels	15.50	15.00	17.00	15.00	17.00	16.00
Choice No. 1 R. R. wrought	19.00	18.25	20.25	18.75	20.50	19.75
Machinery cast	15.75	15.25	16.50	15.25	16.50	16.00
Wrought iron pipe	14.75	13.75	15.75	14.50	15.75	15.25
Wrought turnings	12.75	11.50	13.75	12.50	14.50	13.50
Stove plate	13.50	13.00	13.75	13.00	14.25	13.25
Cast borings	12.00	11.00	12.75	11.75	13.50	12.25

The Outlook.

The prospect for the coming year in iron and steel is decidedly favorable. A strongly optimistic feeling pervades every branch of the trade. Conditions for a good volume of business are very satisfactory. There was a gradual betterment during the last six months of 1908, and both manufacturers' and merchants' stocks of raw and finished materials, while generally greater than they were some months ago, are still comparatively small, and it is evident from continued reductions of stocks of pig iron in makers' hands that consumption is on a better basis. The feeling of confidence in the future, which was entirely absent at this time last year, is strong and buyers are to a certain extent willing again to anticipate their wants. The financial situation is good and holders of funds are again turning their attention to industrial propositions. Costs of finished materials appear to be on a firm basis, a decline not being looked upon as likely unless production should again creep up too fast. Makers, however, appear to have the situation well in hand, and while business is expected to improve materially, the trade would be best served by a slow steady growth, leading gradually to the normal. It is considered that to reach that point by midyear would be doing very well. A strong iron and steel demand cannot be expected, however, until the many industrial plants which have been running during the past year at greatly reduced capacities have again become fully occupied, and they themselves become active buyers. New projects which have been laid away during the past year awaiting better times are again the subject of thought, but anything of importance along this line, particularly if in any way affected by tariff revision, will likely be further held up until something more definite is learned in that direction. In fact, the present hearing at Washington on the tariff is the only real cloud on the iron and steel horizon, and the expressions on the part of masters in the trade are so varied on this subject that the trade has paused temporarily to await developments.

The railroads, which during 1908 were very light buyers of materials and equipment, are expected to become quite active purchasers early next year, and should the volume of their business reach but 50 per cent. of that in 1906 and the first half of 1907 it would go a long way toward bringing conditions back to the normal. Recovery is at the best, however, a slow process, and those who expect an immediate return of prosperity directly after the turn of the year are likely to be disappointed. On the whole the situation is favorable, and if the forward movement can be controlled and maintained within reasonable bounds the trade will no doubt have quite a satisfactory year.

Transatlantic passenger travel to and from New York in 1908 reached a total of 1,530,161 persons, of whom 670,680 were westbound or incoming and 859,481 were outgoing or eastbound.

THE PITTSBURGH IRON TRADE IN 1908.

BY ROBERT A. WALKER.

The iron trade made a record in 1908 of passing through one of the worst years in its history in some respects, and yet one that reflects much credit on those who are actively connected with the trade and have to do with shaping its policies and progress. The year has been unique in many ways, and only a feeling of satisfaction can be experienced by those who have gone through it that conditions were no worse and that its lessons will be beneficial as a guide for the years to come.

When the year 1908 opened the outlook was anything but encouraging, numerous plants were shutting down and production was being heavily reduced. This was the remedy for the situation which presented itself most strongly to the manufacturers of iron and steel, and the one that did more than anything else to avert financial disaster to many concerns. The heads of the United States Steel Corporation and other large steel interests quickly made up their minds that the time had arrived when united action was absolutely imperative and that only by working together and making a united effort to maintain the market could impending trouble be averted. To Chairman E. H. Gary of the United States Steel Corporation, probably more than any other man, belongs the credit of conserving the steel trade of the country and bringing it with minimum damage through the most trying period of its history. The conferences in New York held at the request of Judge Gary are now a matter of history, but the amount of benefit that was derived to the iron trade by those who were called into the councils of the steel manufacturers cannot and never will be properly estimated. Had a condition such as existed in the steel trade at the opening of 1908 occurred 10 years ago, or before the formation of the United States Steel Corporation, it is not too much to say that the worst depression the country has ever seen would have been experienced, and many concerns that went through the year with probably a balance on the right side of the ledger might have been forced into bankruptcy and possibly might have been eliminated altogether. The country owes a debt of gratitude to the heads of our steel companies, who steered the ship of industry through the storm that threatened to sink it. There was almost an entire lack of the spirit that was so prominent in former years of the strong interests trying to force out the weaker ones, but, on the contrary, the latter were given assistance in more ways than one and were thus enabled to weather the storm.

How Pittsburgh Started the Year.

In the beginning of 1908 industrial conditions in Pittsburgh were anything but satisfactory. Many plants had closed down entirely, others were running to 25 or 30 per cent. of capacity, and manufacturers who had received orders for their products were almost afraid to make shipments lest financial trouble would overtake their customers before the bills became due. There was a feeling among consumers that prices could not be maintained, and as a result orders were placed only for small lots of material to fill current needs, and this was probably one of the best things that could have happened. In addition to this jobbers throughout the country were carrying heavy stocks of material bought at high prices, and a sudden drop in values, which would have affected these stocks, would have probably brought ruin or heavy losses to many commercial houses. These can now look back over 1908 with a feeling of satisfaction that, while their profits were not large, and perhaps some made none, yet they were able to pull through the crisis without disaster.

The railroads and their affiliations have been estimated to consume about 55 per cent. of the total output of iron and steel in its various forms, but when the year opened not a railroad in the country was buying any material to speak of, and many of them were unable to get money to take care of obligations that were falling due. The demand from the railroads had been cut off as with a knife, and from other consumers had dwindled to about 25 per cent. of normal. With this condition existing the steel manufacturers cut down their output to the lowest possible point and made only what the country could take. The large interests closed down plants that for several years had been running to utmost capacity, but were in splendid physical condition. As a conspicuous example of this restrictive policy the Carnegie Steel Company alone closed down seven or eight of its leading steel plants, some of which are still idle, while others were started partially during the year as the demand improved.

The financial stress, which was so severely felt in the closing three months of 1907, quickly lightened with the coming of 1908, but the banks had been taught a severe lesson, and in spite of the fact that they had ample funds it was almost impossible for manufacturers to get loans, even with sound collateral to protect them. For this reason extensions to plants and new construction during nearly all of 1908 were at a low ebb, and the leading iron and steel constructing interests have probably felt the depression to a greater degree than any other line of business. The fact that 1908 was a Presidential year may possibly have had some slight influence and retarded the return of prosperity, but if so it was very slight, as the country seems to be gradually getting away from the idea that a Presidential year must always be a lean year in business.

While conditions in the first three or four months of 1908 were as bad as they could possibly have been, with the coming of the spring months and the starting of seasonable trade, a slow but gradual improvement in demand took place. Some of the most optimistic made predictions that by July 1 the country would be back to a normal basis, but they were deceived. Business in all lines in the first half of 1908 were remarkably quiet. The second half made a better record, but in the entire year the country did not consume more than 55 to 60 per cent. of the quantity of iron and steel that it took in the previous year. In spite of this at no time was there any demoralization in prices, but, on the other hand, the general situation was kept well under control. Of course it would be folly to say that regular prices on steel products were always maintained, as concessions were quietly made by most sellers, but at no time was there an appearance of a wide open market and bottomless prices.

New Construction.

In the building of new blast furnaces, iron and steel plants and making additions to existing works, the past year was one of the leanest for a long period. The United States Steel Corporation, however, through its subsidiary companies, led the way as usual in building new plants and making additions to others.

In the Pittsburgh District the principal additions made by the Carnegie Steel Company were the building at the Duquesne Works of two blast furnaces of about 550 tons daily capacity each and 12 open hearth furnaces of 65 tons capacity each. These are all about finished and will be ready for operation very early this year. It is understood that plans are being drawn for the building of five or seven new finishing mills during 1909 at the Duquesne Works, but this is not officially confirmed, nor has any appropriation yet been made by the United States Steel Corporation for that purpose. Other new work of the Carnegie Steel Company consisted mostly of the finishing of construction started in 1907, but which was not hurried, as there was no urgency for the additional output. At its Ohio Works, at Youngstown, Ohio, the two new blast furnaces and 12 50-ton open hearth furnaces started in 1907 have not been completed, but will be finished early this year. Had the necessity existed they could have been finished in the summer of 1908. The usual high physical condition of all the company's plants has been maintained through the year.

The Jones & Laughlin Steel Company practically suspended all work at its new Aliquippa plant in the fall of 1907, and this has not yet been actively resumed. The plans for this plant contemplate the building of four blast furnaces, six Talbot open hearth furnaces and blooming, structural, rail and plate mills. When the depression started the work was stopped, and in spite of recent reports has not been resumed. It will probably be the middle of the year or later before any of this new construction is finished.

The largest addition to active works in the district during 1908 is the new open hearth plant built by the Pittsburgh Steel Company at Monessen, Pa. For some years the company had operated large rod and wire mills at Monessen, but had no steel plant. It had been a buyer of billets under a five-year contract, but decided to make itself independent of the steel market by building its own steel works. The plant, which is of the most modern type, was pushed to completion, comprising eight 60-ton open hearth furnaces. The first steel was made August 20, and the entire plant is now in successful operation. This company is a consumer of pig iron, bought from merchant furnaces, to the extent of 800 to 1000 tons per day, and also a heavy consumer of steel scrap.

The La Belle Iron Works, Steubenville, Ohio, completed in June the building of a 72-in. plate mill, jobbing and sheet mills. An illustrated description of these additions appeared in *The Iron Age* of July 2. Other minor additions and improvements were made by the company, and it is now one of the largest independent manufacturers of pig iron, steel, pipe, plates, black and galvanized sheets and cut nails. The company is self-contained, manufacturing its products from its own ore to the finished material, and in the past few years has more than doubled its capacity.

At Youngstown, Ohio, the Youngstown Sheet & Tube Company set the pace in the matter of new additions, having completed and put in operation in the year two blast furnaces, each with a daily capacity of 500 tons, which have made some splendid records for output. This company now operates blast furnaces, a Bessemer steel plant and finishing mills making iron and steel pipe, iron and steel sheets, skelp and other products, and is one of the leading concerns in the country in these lines. In the early part of last year it bought the plant of the Morgan Spring Company at Struthers, Ohio, comprising rod and wire mills, and is also one of the leading manufacturers of wire rods, wire nails, plain and barb wire. After purchasing the plant of the Morgan Spring Company the rod mill was double stranded and other additions were made so that its capacity was about doubled. It is about to increase its capital from $6,000,000 to $10,000,000, and part of the additional money will be used in the building of two more blast furnaces, work on which will probably be started in a short time. This company also makes its products from its own ore.

The American Sheet & Tin Plate Company did not build any new sheet or tin plate plants in 1908, but maintained at all its mills its high standard of physical condition. At the Greer and Shenango Works, at New Castle, Pa., some additions to equipment were made that will materially increase the output at both these plants.

A. M. Byers & Co., Inc., operating mills on the South Side, Pittsburgh, making iron pipe, and also owning and operating Mattie Furnace at Girard, Ohio, placed contracts about the middle of 1908 for the building of new mills at Girard for the manufacture of muck bar and skelp, the idea being to make these products close to the blast furnace, saving the haulage of the pig iron, afterward shipping the iron skelp to its pipe mills in Pittsburgh. It is, however, probable that eventually the pipe mills may be removed from Pittsburgh to Girard.

The Republic Iron & Steel Company did not undertake any important construction in the Youngstown District, but made minor improvements and some additions to equipment at its Bessemer steel plant, which is now regarded as one of the leading plants in the country. This company operates six blast furnaces in the Mahoning and Shenango valleys which afford an ample supply of pig iron for its steel works and make it independent of the general market.

The Shenango Furnace Company of Pittsburgh rebuilt one of its blast furnaces at Sharpsville, Pa., and now has three modern stacks at that place making about 1000 tons of pig iron per day.

The Allegheny Steel Company, Farmers' Bank Building, Pittsburgh, with works at Brackenridge, Pa., maker of sheets and plates, finished one new 50-ton open hearth furnace during the year, and in December placed a contract for the building of a 20-ton furnace in which steel will be made for rolling into sheets of special analysis.

The Superior Steel Company, Pittsburgh, with works at Carnegie, Pa., is adding an open hearth steel plant which will be completed early this year.

Other iron and steel concerns in the Pittsburgh District made minor additions to plants, taking advantage of the depression when works were idle to make these additions, and it is safe to say that the physical condition of the Pittsburgh manufacturing plants was never better than at this time. From present appearances it is probable that during the first half of the year, at least, new construction will be light.

The Pig Iron Trade.

There are 48 blast furnaces in the Pittsburgh District proper, of which the Carnegie Steel Company operates 32, American Steel & Wire Company 4, Clinton Iron & Steel Company 1, Jones & Laughlin Steel Company 6, National Tube Company 4, and Midland Steel Company 1. These 48 stacks have an annual capacity of very close to 7,250,000 tons, and when all are in operation the district turns out about 30 per cent. of all the pig iron made in the whole country. The companies enumerated, except the Clinton and Midland, consume in their own steel plants the pig iron they produce, and the main supply of the merchant pig iron sold in and about Pittsburgh comes from the furnaces in the Shenango Valley in Pennsylvania and the Mahoning Valley in Ohio. These are the valleys referred to in this review.

Basic pig iron has become an important factor in the market. Several months ago a number of large consumers made contracts with furnaces for their supply through the first quarter and in some cases through the first half of 1909, based on prices printed each week in the market reports in *The Iron Age*. A number of Valley furnaces that formerly ran on Bessemer iron operated nearly the entire past year on basic, and the output of basic in the two valleys is now larger than Bessemer. The year 1908 was one of the leanest the foundry trade has had in a long time, and as a natural result the consumption of foundry iron was comparatively light and prices ruled low. The demand for gray forge iron was dull through the year until November was reached, when some fair sized sales were made for delivery through the first quarter and first half of 1909. Prices ruled so low that little forge iron was produced.

In the month of January the blast furnace interests tried to effect an organization to maintain prices on the basis of $18 for Bessemer, $17 for basic and $17 for No. 2 foundry, all at Valley furnace, but the demand for pig iron was so dull and two or three furnaces were so anxious to sell that it was impossible to do so, and there was a steady decline. In April standard Bessemer iron had touched $16.50 at Valley furnace, basic about $15.50 and No. 2 foundry about $15. By July 1 Bessemer was weak at $16, basic $15, No. 2 foundry at $15 and gray forge about $13.75 at furnace. At this time the Pittsburgh Steel Company had about completed building its steel plant at Monessen, Pa., and entered the market for large blocks of basic iron, which had the effect of strengthening prices to some extent. It bought heavily of basic in July, taking upward of 30,000 tons. By October 1 pig iron had shown some betterment in output, but this had the effect of still further weakening prices, and at this time Bessemer iron was weak at $15 and malleable Bessemer at $14.50, while No. 2 foundry was selling very close to $14 at Valley furnace. The lowest prices reached on pig iron in the Pittsburgh District during 1908 were in the month of October when Bessemer iron reached $14.50 or lower, basic $13.85 and Northern No. 2

foundry about $14 at Valley furnace. In November, owing to heavy purchases of basic iron by the Pittsburgh Steel Company, Allegheny Steel Company and some Western consumers, prices hardened, and early in December there was a recovery of about $1 a ton. The year closed with Bessemer iron ruling for first quarter shipment at about $16.50; malleable Bessemer, $16; basic, $15.50 to $15.75; No. 2 foundry, $14.50, and gray forge about $14.50, all at Valley furnace.

To get a clear idea of the range in prices of Bessemer, basic, No. 2 foundry and gray forge through 1908, average monthly prices, are given as follows, on these grades of iron, f.o.b. Valley furnace, to which 90 cents a ton freight should be added for delivery in the Pittsburgh District:

Pig Iron Prices, F.o.b. Valley Furnace.

Month, 1908.	Bessemer.	Basic.	No. 2 foundry.	Gray forge.
January	$18.10	$17.10	$16.58	$15.94
February	17.00	17.00	15.88	15.06
March	16.96	16.00	15.69	14.81
April	16.59	16.00	15.05	14.35
May	16.03	14.83	14.40	14.00
June	16.00	15.25	14.88	13.90
July	15.83	14.49	14.70	13.85
August	15.21	14.62	14.45	13.69
September	15.00	14.27	14.30	13.45
October	14.58	14.25	14.35	13.50
November	15.84	14.93	14.72	13.90
December	16.50	15.50	15.50	14.37

Steel Billets.

The year 1908 in the steel billet, sheet bar and tin bar trade was one of the leanest since 1903. The demand for steel all through the year was quiet, owing to the fact that consumers did not have sufficient orders for finished material to run their plants full, and therefore used less steel than for a long time. When the year opened Bessemer and open hearth billets were nominally $28, forging billets $30 and sheet and tin bars $29, all f.o.b., Pittsburgh. While these were the official prices there is no doubt that they were being materially shaded in spite of efforts of the mills to hold the market. None of the steel plants was running to more than 40 to 50 per cent. of capacity, while a number of leading plants were closed down, the idle works at this time being Donora, Bellaire, Mingo Junction, Columbus and South Sharon works of the Carnegie Steel Company, and the close of the year found these plants still idle, with the exception that South Sharon and Mingo were operated to partial capacity, while in the first week of the new year six open hearth furnaces at Donora were started.

Nominal prices remained on the basis of $28 for Bessemer and open hearth billets, $30 for forging billets and $29 to $29.50 for sheet and tin bars until June 10, at which time the mills made a reduction of $3 a ton on Bessemer, basic and forging billets and $2 a ton on sheet and tin bars. This action was made absolutely necessary by the fact that prices on some lines of finished iron and steel had been reduced, and also by the fact that for three or four months the mills had been quietly cutting prices of billets $2 to $3 a ton, and their action in announcing the reduction was simply making public what had been done privately for some time. The new prices of $25 for Bessemer and basic billets, $27 for forging billets and $27.50 for sheet and tin bars in random lengths continued in force until the close of the year.

At different periods during 1908 pig iron dealers made conversion deals with outside steel mills by which they were able to furnish small quantities of both Bessemer and basic billets, mostly the latter, at prices under the regular rates quoted by the mills. These sales had the effect of disturbing the market to some extent, but when the mills reduced prices $3 a ton on June 10 this practice was largely stopped, as the reduction eliminated any chance of the outsider making such deals and selling steel at a profit.

Finished Iron and Steel.

The demand for finished iron and steel of all kinds was remarkably dull, especially in the first half of the year. In January, February and March leading interests making various forms of finished iron and steel were not able to operate their plants to more than 35 to 40 per cent. of capacity. This rate of operation continued until May or June, when conditions showed some betterment, and from that time on until the close of the year the operating capacity was slightly increased each month, but the recovery was slow. The wire, sheet, tin plate and pipe trades probably made the best records in the matter of actual orders entered. Plates were very dull all through the year, owing to an almost complete cessation of steel car building, as this industry takes a very large percentage of all the plates made. The reduction of $4 a ton in steel bars, $3 a ton in iron bars and $2 a ton in plates, structural material and pipe, which went into effect on June 10, stimulated the demand considerably, notably in steel bars, as buyers were holding back business feeling certain that a reduction was coming.

Structural material opened the year on the basis of 1.70 cents for beams and channels up to 15 in. and 1.80 cents for larger sizes. Most of the structural mills were running to only 45 or 50 per cent. capacity. There were times during the year when large structural plants were shut down entirely, waiting for sufficient orders to accumulate to warrant starting up. These prices continued in force until June 10, when on account of lack of demand and a feeling that possibly a reduction in prices would stimulate trade, structural steel was reduced $2 a ton or to the basis of 1.60 cents for beams and channels up to 15 in. There was a feeling in the trade that the reduction was not heavy enough, and it failed to have the desired effect of stimulating the demand, which continued quiet until the close of the year. Some relatively low prices were made by the large structural steel interests on contracts taken during the last half of the year, and complaints were made by fabricating interests without mill connections that the low prices made left them practically unable to compete.

The plate trade in 1908 was remarkably light all through the year. At times the output was down to about 25 to 30 per cent. of capacity, and at the close of the year was roughly estimated at 50 to 60 per cent. of capacity. The year opened with prices of sheared plates ¾ in. thick on the basis of 1.70 cents, Pittsburgh, but June 10 plates were reduced $2 a ton or to the basis of 1.60 cents, Pittsburgh, this price being in force at the close of the year. Practically all through the year prices on plates were shaded, mostly on the narrow sizes by outside mills, to the extent of $1 to $2 a ton. Reports were current during the year of heavier cuts in prices, but these were not confirmed.

The demand for iron and steel bars in the first five months of 1908 was extremely dull, jobbers and consumers alike holding back orders and only placing such quantities as were actually needed, believing that a reduction in prices was certain. Mills were running to only 30 or 40 per cent. capacity, and this condition continued until early in June, when at a meeting of the steel bar interests it was decided to reduce prices $4 a ton, or from the basis of 1.60 cents to 1.40 cents, Pittsburgh, for base sizes. At once some very heavy contracts were placed by leading consumers, aggregating 600,000 tons or more, and for delivery in most cases for a year ahead. Prices on iron bars were also reduced from 1.50 cents to 1.40 cents, base, for Pittsburgh delivery, and 1.35 cents, base, for Western points, the price being fixed at 1.50 cents, delivered, Chicago. Not much new business was placed in the last half of the year in either iron or steel bars, large consumers having covered by contracts on which specifications came in steadily through the entire last half of the year. About the middle of November prices of iron bars were advanced to the basis of 1.50 cents, for delivery in the Pittsburgh District, and 1.42 cents, Pittsburgh, for Western shipment, or to 1.60 cents, Chicago. These prices are still in force.

Early in January the three leading makers of hoops and bands—the Carnegie Steel Company, Sharon Steel Hoop Company and Pittsburgh Steel Company—fixed the price of steel hoops at 2 cents, base, and steel bands 1.60 cents, Pittsburgh. When the reduction of $4 a ton in steel bars was made, effective June 10, the makers of hoops and bands reduced prices on each $4 a ton to correspond with the reduction in steel bars. These prices continued in effect until the close of the year.

The first half of the year in merchant pipe trade was

extremely quiet, but, effective June 10, prices were reduced two points or $4 a ton, making the extreme limit on steel pipe, ¾ to 6 in., 76 and 5 per cent. off the list to the large trade. These prices continued in force through the rest of the year. The demand for both merchant and line pipe showed material betterment in the last half over the first half of the year. Some heavy contracts for line pipe were placed in November and December, and the outlook is that the demand will be enormous this year for the larger sizes of pipe, some large projects for laying oil and gas lines being under way.

Steel Rails.

The year 1908 in this trade makes a poor showing as compared with previous years, notably 1907, when the output of rails of all kinds in this country was 3,633,654 gross tons, while unofficial figures give the total shipments of rails against orders by all the mills in 1908 as about 1,600,000 tons. Large railroad systems bought practically no rails in 1908, owing partly to a difference with the mills as regards specifications, but more largely from the fact that the railroad companies were not in position financially to make cotracts for rails. The price of standard sections remained steadily at $28, at mill, through 1908, and has been reaffirmed at the same figure for this year.

The trade in light rails during 1908 was fairly good, the demand being quite active in the last three or four months of the year. To meet the competition of light rails rerolled from old rails, the makers of light rails rolled from billets made a reduction of $3 a ton, which put 25 to 40 lb. rails on the basis of $25, at mill, with the usual advances for lighter sections. Even these comparatively low prices did not prevent cutting, and it is a fact that during the year light rails rerolled from old rails sold at $22 and perhaps lower.

At no time during the year was the Carnegie Steel Company able to operate its Edgar Thomson rail mills to more than about 30 per cent. of capacity. No rails were made at the company's Ohio Works during 1908. Just before the close of the year the Pennsylvania Railroad placed an order for 135,500 tons of standard sections, with an option on 25,000 tons more, but none of the other large systems has yet placed its contracts. The outlook is that 1909 will be a much better year in the rail trade than the year just closed.

Iron and Steel Scrap.

In sympathy with other lines, old material was quiet during practically the entire year, and prices on whole were low. None of the finishing mills that are large consumers of scrap was able to operate at any time in the year to full capacity, and as a result the consumption of scrap was much below normal.

The year opened with trade practically lifeless. Heavy steel scrap was quoted at about $12.50 per gross ton, or less, and other grades were on the same proportionate basis. Late in February the demand picked up and prices improved to some extent. Heavy steel scrap sold as high as $13.50 to $13.75, and prices ruled practically on this basis until the middle of March, when another slump came. In April heavy steel scrap was weak at $13, and before that month closed had declined to about $12.50. The market remained without material change through April and May, but early in June the demand improved, and the price advanced to $13.50, or higher. This improvement, however, did not last long, and early in July, owing to the shutdown of a large number of mills for repairs and settlement of the wage scales, prices again declined.

In the latter part of July a buying movement was started which forced the price up to $14.50 and higher for heavy steel scrap. At this time the Pittsburgh Steel Company came in the market for large quantities of heavy steel scrap and other grades, and this had the effect of causing an advance in prices and something of a scarcity in supply. In August the market quieted down again, largely owing to the low prices ruling for basic and Bessemer iron, and continued quiet until early in October, when an improvement started which continued until the close of the year. There was almost a steady advance in prices in November and December, and the year closed with heavy steel scrap decidedly scarce and selling as high as $17, Pittsburgh. Large scrap dealers in Chicago, Pittsburgh, Cleveland, Toledo and other scrap centers had accumulated heavy stocks and were holding them for higher prices. Not much material was sold in December, consumers refusing to pay the high prices asked by dealers, and the situation had the appearance of a deadlock, with both sides determined to maintain their respective positions. We give below a table showing average monthly prices per gross ton of the leading grades of scrap at Pittsburgh during 1908:

Month, 1908.	Heavy steel scrap.	Bundled sheet scrap.	Cast iron borings.	No. 1 cast scrap.
January	$12.60	$9.31	$6.25	$14.56
February	13.88	9.75	7.87	15.25
March	13.10	9.90	7.71	14.95
April	12.75	8.65	7.55	14.60
May	12.56	8.50	7.05	13.95
June	13.10	8.79	7.30	13.90
July	14.10	11.10	8.25	14.15
August	14.81	12.19	9.25	14.40
September	14.40	12.25	8.80	14.30
October	15.12	12.44	9.31	14.69
November	16.10	12.75	10.44	14.50
December	16.55	14.10	11.30	14.90

Connellsville Coke.

In sympathy with the dull year in pig iron and in trade among the foundries, the demand for blast furnace and foundry coke throughout 1908 was quiet, and prices ruled low. At no time was there more than about 50 per cent. of the coke oven capacity in the Connellsville regions active, and for most of the year it was at less than 50 per cent. The situation became so bad and prices so low that about the middle of the year the smaller coke companies got together and formed an association known as the Independent Coke Producers' Association, for the purpose of trying to sustain prices and put the market on a better basis. These efforts were fairly successful, the principal work done by the organization being the shutting down of ovens to try to conform output to actual consumption. The building of new ovens in the coke regions was much lighter than usual, but a number of leading interests, such as the Frick Coke Company, the Bessemer Coke Company, Washington Coal & Coke Company, Jamison Coal & Coke Company and others, improved the physical condition of their plants and built some new ovens.

The year opened with the output of Connellsville coke running less than 150,000 tons a week and only about 30 per cent. of the ovens active. Effective January 1 the H. C. Frick Coke Company and practically all other coke operators made a reduction in wages of about 9 per cent., and this at once had the effect of causing lower prices for coke. In the second week of January the output was running less than 100,000 tons per week, but at the close of the month had gone up to about 140,000 tons per week. At this time, out of 36,158 ovens in the two Connellsville regions, only 14,469 were active. At the close of February the output had increased to 180,000 tons a week and nearly 18,000 ovens were in blast. In the early part of April the demand for furnace and foundry coke was very quiet, and best grades of furnace coke for prompt shipment were as low as $1.60 a net ton at oven. The output had again gone down to 160,000 tons per week, and the general condition of the coke trade was very unsatisfactory. In the first week in May the output was running about 160,000 tons per week, and best grades of Connellsville furnace coke for prompt shipment were selling as low as $1.45 a ton.

On July 1 there was a little better demand for furnace coke, due to the starting up of two or three furnaces in the valleys. The output of coke in the Upper and Lower Connellsville regions in the first six months of 1908 was only 4,500,000 net tons, against 10,755,452 tons in the first six months of 1907. The beginning of August found no improvement in the trade, the output running about 180,000 tons a week with less than 50 per cent. of the ovens in operation. By the middle of September the output had crept up to 200,000 tons, but prices continued very low, Connellsville furnace coke for prompt shipment selling at $1.45 to $1.50 at oven, and was being offered for shipment over the balance of the year as low as $1.60 per ton.

In the first week in October the demand for furnace

and foundry coke showed a slight betterment, but the output was small, owing partly to lack of demand and partly to a failure in the water supply due to drouth. This condition continued through October, and in the last week of that month the Frick Coke Company banked 1300 ovens. By the middle of November the coke business was showing betterment and prices on both furnace and foundry commenced to improve. At this time Connellsville furnace coke for prompt shipment was selling at $1.70 to $1.75, and about 55 per cent. of the ovens were active. In the first week in December Connellsville furnace coke for prompt shipment was firm at $1.85 to $1.90, and the output was running about 220,000 tons a week. Some heavy rains in December had the effect of materially increasing the supply of coke, and prices on both furnace and foundry for prompt shipment showed a decline. The year closed with the output running about 250,000 tons a week and with 60 per cent. of the ovens in operation. For purpose of comparison we give below average monthly prices per ton of 2000 lb., on cars at oven, on Connellsville furnace coke for prompt shipment and on Connellsville 72-hr. foundry coke on contracts during 1908:

Month.	Connellsville furnace coke.	Connellsville 72-hr. foundry coke.
January	$1.90	$2.60
February	1.85	2.45
March	1.72	2.25
April	1.55	2.25
May	1.47	2.15
June	1.56	2.15
July	1.55	2.15
August	1.50	2.15
September	1.50	2.15
October	1.55	2.15
November	1.72	2.10
December	1.80	2.10

Labor Matters.

There were no strikes of any moment in the iron and steel and affiliated trades in 1908, the workmen being more concerned in finding employment than in going on strike. The scales of the Amalgamated Association were quickly adjusted, prices for puddling and finishing being slightly reduced, while the sheet and tin plate scales were renewed for one year from July 1 on practically the same basis as governed the preceding year. It is remarkable how well wages were maintained at high rates during 1908, in spite of the great business depression through which the country was passing. It bears out conclusively the statement of the steel manufacturers and other interests that they are always willing to pay the highest rate of wages they possibly can.

Should a material reduction come in the tariff, and this is forecasted, it is possible that our manufacturers may find it necessary to make reductions in wages to protect themselves, but if made it will be forced on the manufacturer by the lower duties on iron and steel and to enable them to compete with foreign manufacturers. The outlook for labor in the year 1909 is better than in 1908, the indications being that the mills and manufacturing plants of all kinds will run more steadily this year than they did in 1908. The only material reduction in wages made during the year was one of about 10 per cent. in wages of coke workers, made by practically all concerns in the Connellsville and other coke regions.

Conclusion.

A feeling of relief can be experienced that the year is over, that it was no worse and that many concerns closed their books for the year with a balance on the right side of the ledger. All signs point to a gradual recovery in the iron trade and a much better year than that just closed. The disturbing feature at the close of 1908, and the one that still confronts the trade, is a probability of material reductions in the tariff. The probability that the new tariff will not become effective before July 1 is bound to have some disturbing influence, as it will have the effect of causing buyers to limit purchases until the reductions in the duties on iron and steel are definitely known. The railroads went through 1908 with only such purchases as they could not defer for repair work and renewals, and it would seem that from these interests alone the consumption of iron and steel in 1909 should be much heavier than in the year just closed. While 1909 holds out promises of being a better year than 1908, it is not probable that normal conditions will be reached in the iron trade until late in the year.

THE CINCINNATI IRON TRADE IN 1908.

BY H. EUGENE HALL.

Burdened with the memories of that fateful last quarter of 1907, and harassed with the fears that such a spasmodic contraction of business must necessarily have on the destinies of the ensuing twelvemonth, with a Presidential campaign to add confusing side lights, small wonder that the beginning of 1908 looked dark and drear. Unusual restriction in outputs, a wholesale blowing out of furnaces, a tumbling of prices, a shutting down of large tool producing concerns and, for the foundrymen, cold cupolas and idle patterns—all these things were freely predicted for the iron trade in this market at the beginning of the year.

The Cincinnati market is an essentially sensitive one. The element of conservatism is always in evidence. At the turn of 1907, men old in the trade concurred in the editorially expressed opinion that the year, in prospect, furnished unexampled opportunity for concerted action of producer and consumer alike—the exercise of the best business sense that in them lived. Retrospectively then, a composite opinion of the gentlemen who make the Cincinnati markets of iron, machinery products and allied branches one of the most important interior markets of the country would be briefly: "We are glad it is over"; and as that frequent contributor to the columns of *The Iron Age*, James A. Green, said in reply to a query of the writer: "The best thing about the year 1908 is that it is nearly over and we can forget it. Of course it is leaving us a delightful heritage in the form of great expectations for 1909, which we all devoutly pray may be realized."

Pig iron men in this market recall no parallel to the 1908 experience, unless it be that of the first McKinley term, 12 years ago. But, inconsistent as it may seem, in the light of the bad prospects at the beginning and the delayed recovery on the eve of election, no selling agencies seemed to suffer; only one was discontinued through receivership proceedings (although the business lost nothing because of it, being transferred to another large agency), and during the last quarter there were actually three or four new agencies contemplated, at least one of which is likely to develop early in the new year, the others being restrained only because of their inability to get furnaces to represent. And as a fitting finale the announcement is just made that the Cincinnati market, already strongly cemented to the other great iron centers, East and West, through the Rogers-Brown, the Matthew Addy, the Domhoff-Joyce and the Walter-Wallingford agencies, is to be strengthened and given added importance by the newly effected combination of the strong Hickman, Williams & Co.'s Western and central connections with those of N. S. Bartlett & Co. in the East, the former concern absorbing the latter, completing a chain reaching from St. Louis and Chicago on the West to Boston in the East.

Tool manufacturers shudder in recalling those wholesale cancellations and peremptory "hold-ups" of late 1907; but, on the other hand, could not but find some little satisfaction in the bulletin of the National Metal Trades Association, sent out from Cincinnati headquarters early in January, which said: "For the first time in the history of our organization we have not a single strike on hand."

A Gentlemen's Agreement.

The advent of January 1 found furnacemen of the South preparing for a gentlemen's agreement, with delightful visions of restricted production, a $14 furnace price and urgent necessity as special lodestone, which should attract the wary coin to the ironmasters' till. There was but a meager amount of iron on Southern yards; the closing months of 1907 had witnessed a wholesale blowing out of furnaces, leaving at the turn of the year but nine stacks in blast in the Birmingham District and but six in Tennessee. The Ohio field presented a still stronger picture of furnace inactivity, but one furnace on foundry iron blowing—Nellie of the Marting group. It was said very generally at that time that the southern Ohio producers had an agreement and were for the most part living up to it. There was but little contract iron in dispute at the turn of the year and a comparatively small amount of iron on furnace yards, owing to the excellent generalship displayed by those who controlled the destinies of the great producing districts.

For a study in contrasts take the condition of furnace order books on January 1 of the years 1907 and 1908, respectively. Furnace companies opened the year 1907 with full order books and the future looked like a dream picture of Lucullus-like plenty; to most of them on the corresponding day of the succeeding year it seemed like nothing so much as a bleak arid waste, with penury for company and any sort of pie an uncertain item of dessert. With these strongly contrasted pictures before us then the actual price conditions in the opening and the closing weeks of 1908 furnish an exceptionally interesting study:

	F.o.b. Birmingham.		F.o.b. Ohio furnace.	
	*January.	†December.	*January.	†December.
No. 1 foundry	$13.50	$13.50	$17.00	$16.00
No. 2 foundry	13.00	13.00	16.50	15.50
No. 3 foundry	12.50	12.50	16.00	15.00
No. 4 foundry	12.00	12.00	....	....
Gray forge	11.50	11.50	....	....

* First week in January. † Last week in December.

The Southern producers, it will be seen, opened and closed the year at identically the same prices, and, recalling the outlook respectively of the two seasons, could it have been more dissimilar?

But Ohio iron closed $1 lower than it opened the year, which some oracles attribute to the late year sharp competition of the Valley producers and the aggressiveness of certain new competitive interests in the field. It was not until early in April that the Ohio furnace interests showed any special disposition to cut prices, and this was coincident with the widely reported break in Valley prices, sales being made on basis of $15 and $15.25 for No. 2 foundry at furnace. Ironton interests then, it is said, began taking business at about $15.50, at furnace. About the middle of May the situation in southern Ohio was one of peaceful waiting, very little business coming out in the face of the fierce onslaughts of the Valley producers and the aggressiveness of some of the Southern ironmasters, at least two of whom were willing at this time to accept $11.50 for No. 2 for spot shipment.

Some Leading Features of the Year.

As in 1906, iron reached its lowest ebb in the Cincinnati market about the middle of the year. The 1906 minimum price was $12.75, Birmingham, for No. 2, and at Ohio furnace $15.50. In May, 1908, the bottom was reached in the price of $11.50 for Southern No. 2 when $15 was done on southern Ohio at furnace. These prices were maintained for the entire month under a light inquiry except that in the last week of the period the Ohio product took a little spurt and advanced 50 cents, which was well maintained apparently until about the middle of June, when it again receded to the $15 figure, losing 25 cents in the last week of September, but being forced up again under the stimulus of ante-election excitement the second week in November, reaching $15.50 at furnace at the close of the month under the heavy buying, which price closed the year for requirements covering the first half, against the $13 figure of the Southern product. At the existing freight rates of $3.25 from the Birmingham and $1.10 from the Hanging Rock District, the price of the two irons delivered in Cincinnati territory are very nearly the same, namely: For Southern No. 2, $16.25, against $16.10 for the Northern product, which will be more nearly together still when, early in the new year, the old rate of $1.20 from the Hanging Rock District will be restored.

About the middle of January the pipe makers became active in the market, although as usual conducting their negotiations with the utmost secrecy. One notable sale was a 90-day delivery to northern Ohio pipe interests of a 20,000-ton order on a basis of $13, Birmingham, for No. 2, taking the entire product of a Southern furnace.

The Buyers' Association.

About this time the newly organized Iron Buyers' Association, representing melters and manufacturers in the Cincinnati, Dayton, Springfield, Middletown and Hamilton districts, became active; prepared a new form of contract and had frequent meetings culminating finally in the adoption of a form which, however, seems not to have been successful in its purpose, as no evidences of its use have been found.

The stove manufacturers were especially active in the buying markets of January and February. A large Michigan stove company early in February was credited with the purchase of 6000 tons covering a year's requirements on a basis of $12.50 for No. 2, but taking the iron from a neighboring furnace. Selling agencies at this time manifested a willingness to book business for the last half on a basis of $13.50, Birmingham, for No. 2, and $17 at Hanging Rock furnace. In March there were meetings in Cincinnati and elsewhere of furnacemen from the southern Ohio District in the interests of more equitable freight rates on coke to their plants. Late March saw considerable reported shading of prices on Southern iron to $12, with Ohio producers following suit on the $15.50 to $15.75 basis.

In April the notable break in Valley prices occurred with many sales of No. 2 foundry reported in this market at $15 to $15.25; Ironton furnacemen contesting the ground closely at $15.50, at furnace, and insistent rumors from the South at $11.75, Birmingham, having been done. It was at this time, too, that the talk of $10 iron first came into notice, with furnacemen insisting that they would blow out their furnaces first.

The real crux of the price situation was reached in May. Persistent rumors of $11, Birmingham, iron sold in the Chicago territory tended to upset all price arrangements, and for about 24 hr. some heavy selling was noted at around the $11 figure. On the 18th a number of bankers and capitalists from Toledo and Indianapolis territory visited the largest local selling agencies with offers to buy 100,000 to 200,000 tons of foundry iron at $10, frankly announcing that they would, if successful in getting the iron, pile it in yards and hold for higher prices. These offers were not taken seriously by the agencies visited.

A Reminder of 1907 Prosperity.

From the middle to the last of May selling agencies were reminded of the prosperous times of 1907, and caught as they were with comparatively little iron on yards, and production restricted to the minimum, consumers' and speculators' heavy buying soon brought about the expected; and before the end of the month agencies were in receipt of letters from their furnaces announcing that anything sold at the $11.50 price must first be put up to headquarters, and further that this price was liable to be withdrawn upon the shortest notice. The jobbing foundries in this district, such as were not stocked with iron (and some that were), all came into the market at once during the last days of May for quantities ranging from 500 to 2800 tons, and some sales were reported on a basis of about $11.30, deliveries ranging over the balance of the year and occasionally well into 1909.

A slump in prices followed this heavy buying, and coincident with it, the announcement of the $4 per ton reduction in steel bars. No effect was observable in this market from this last effort to instill life into a dead material market, and the prediction of prominent iron and steel selling factors has been fulfilled in the interim.

Northern iron came into the limelight again in June, and the feature of both districts was the scarcity of low

grades. A small tonnage of mottled brought $10.50, Birmingham, and some inquiries for forge and No. 4 were unsatisfied. June ended with every evidence of dullness in the iron markets, but with some promising evidences of coming activity in the announcement that the Licking Rolling Mills would be rolling iron bars in 30 days, and that preparations were inaugurated for blowing in a new furnace in Jackson County, Ohio, the home of Northern high silicons.

The Weber Brothers foundry, one of the largest in this locality, which had been idle several months, was sold July 1, and with the resumption of activities in this interest the local iron foundry family showed no idle cupolas. The agricultural implement manufacturing interests came into the market with inquiries early in July. The daily journals were filled at this time with more or less sensational stories of alleged activity in the manufacturing trade, and some government officials visited the great tool manufacturing plants taking notes on certain types of tools.

The strike of the coal operators in Alabama was expected to stiffen up the price of the Southern product a little, but, as results later showed, it had no appreciable effect, and toward the close of July there was a weakening on the side of the $11.50 quotation. Carload orders for quick shipment were the feature at this time, and consumers began feeling the market for 1909 prices, with furnace people loath to discuss them. Malleable at this time reached its lowest price, namely, $14.75, Ironton, and a considerable tonnage was disposed of. Southern iron came again into notice the first week of August, and it was estimated that not less than 60,000 tons was sold through this market during the last days of July and the first of August, distributed among the pipe companies, the agricultural implement manufacturers and stove and heater manufacturers. This had the effect of bringing out notices from furnaces to selling agents of withdrawal from the market, and from others a minimum quotation of $12.50, Birmingham, for third and fourth quarter, and little iron was sold for a few days of early August that had first been put up to the furnaces for confirmation.

It was at this time that the dealers in old material in this market, already glutted with all kinds of scrap which had no sale, came into the pig iron markets and bought heavily of foundry iron for investment. One dealer took 5000 tons at around $11.50, and before the ultimatum for Southern furnaces about the 10th of the month, withdrawing from the market save for urgent business with consuming customers, had succeeded in getting 10,000 to 12,000 tons more.

August closed with the 31-day record for business in iron, steel and machinery lines. This was considered an auspicious time for blowing in, and the new Hamilton Iron & Steel Company's stack at Hamilton, Ohio, was lighted. At the same time came the announcements that the following furnaces in the South would be blown in within two weeks: Citico, Embreeville, Woodstock, Rockdale and Florence. The furnace at Rome, Ga., had been blown in August 3.

The disturbing influences of the Presidential election began to show in September, and until that event was near at hand, there was little doing. An incident of late October was the reported sale in Chicago territory of a large tonnage of resale Alabama iron at $12.50, Birmingham, which unsettled the Central States markets a bit.

November the Banner Month in Pig Iron.

Early November found the iron markets growing stronger day by day under the influence of favorable election forecasts, and northern Ohio pipe manufacturing interests and Indiana speculators furnished some excitement the day after election. Before the final results were figured, agents estimated that 75,000 tons had been sold through the Cincinnati markets alone within a seven-day period, and some 100,000 to 150,000 in the Central West. The remainder of November found furnace interests in both the Northern and Southern districts taking on conservatism, until the middle of the month hardly a selling agency could negotiate anything of any size, and most of them refused to quote for any forward delivery, withdrawing quotations until further notice.

The month of November is recorded in all sales offices in the Cincinnati territory as the banner month of the year. One large agency stated that it was the best in its 13 years' experience; another the best since August, 1906, which has been a record breaker.

The closing month of 1908 goes on record as one of surprising dullness considering the stirring times of its predecessor. There was practically no demand for spot iron and none for forward delivery, requirements for the first half of 1909 having been for the most part satisfied at heavy buying periods earlier in the year. The foundry melt has increased slowly, which is especially encouraging in this market, as it indicates an enlargement of activities on the part of the machine tool manufacturers whose stock of castings had been absolutely depleted and any orders for new tools necessitated immediate orders of castings.

The monthly average prices at Cincinnati of No. 2 Southern and No. 2 Northern foundry are shown in the following table, and averages also of leading classes of scrap:

Average Monthly Prices at Cincinnati.

	Southern No. 2.	Northern No. 2.	Machinery scrap. Net ton.	No. 1 R. R. wrought. Net ton.	Heavy melting steel. Gr. ton.
January	$16.15	$17.80	$12.00	$10.30	....
February	15.75	17.20	12.00	11.00	....
March	15.50	17.20	12.00	11.00	....
April	15.20	16.70	12.00	10.80	$11.00
May	14.75	16.30	11.13	10.50	11.13
June	15.25	16.45	10.25	10.50	11.00
July	15.00	16.20	10.30	10.40	10.40
August	15.25	16.20	11.13	10.81	12.13
September	15.63	16.39	12.00	12.13	13.25
October	15.75	15.95	12.00	12.50	13.60
November	16.00	16.38	12.38	12.88	14.13
December	16.25	16.60	13.00	14.00	15.50

Finished Iron and Steel.

A review of the year in this market would be incomplete without reference to some material improvements in the finished lines. The production of merchant bars increased, notwithstanding the sluggish demand, and one entirely new plant was started, the Phillemac Rolling Mill Company, beginning about the middle of the year. The old Licking Rolling Mill in Covington was rejuvenated in August after a year or more of litigation and devastation by fire. An increase was made in the output of the Newport Rolling Mill Company, which under the title of the Andrews Steel Company, started in April making its own steel, abandoning its puddling and bar mills. Some bar iron for its own use was made also by the Cincinnati Horseshoe & Iron Company.

The year's trend in the retail and jobbing districts was uneventful, witnessing very slight changes in price of any commodity. The inactivity of tool manufacturers seriously affected trade with most concerns, and comparatively few building operations of any magnitude developed; that is, such as specified structural steel shapes. Twisted steel bars were in active demand for reinforced concrete construction.

In November the first indications of machine tool activity were observable in the orders from tool manufacturing establishments for tool steel, and this demand has increased steadily, suggesting resumption of business at these shops after a year of little or no demand from the dealers and large railroad and manufacturing concerns.

Old Material.

The Cincinnati scrap market has grown stronger and more important with each recurring year. The coming one will see the old material interests presenting a very formidable front, with the promise of some competition among themselves, a factor which has been largely missing in late years. The Southern Iron & Steel Company, an organization made up of prominent men in the iron and steel trade, mostly from the upper part of the State, will join the local old material interest early in the year, and, having the advantage of river transportation and river terminals, with a full equipment of modern tools and machinery for handling heavy scrap, expects to attract a good share of the trade in this market.

The local scrap markets have been largely dealers' markets the past year. Speculation ruled the largest

hardlers of old material, and the large and influential firms comprising them bought steadily for the first three quarters until their yards at election time were filled to overflowing—one dealer estimating his stock at not less than 100,000 tons. It has been a difficult market to report correctly, as the consumers furnished such a small share of its activities. In November some heavy shipments of melting steel were made to Eastern mills, and there were some large sales made in December to mills in the Central West.

The Tin Plate and Sheet Steel Trades in 1908.

BY B. E. V. LUTY, PITTSBURGH.

The production of tin and terne plate in the United States in the year just ended was about 475,000 gross tons, showing a decline of less than 8 per cent. from the previous year. This is a record which cannot be approached even nearly by any other important branch of the iron and steel industry, as all other branches of the industry suffered severely from lack of business. Pig iron production, for instance, dropped off 38 or 39 per cent.

Why the Tin Plate Trade Fared So Well.

The heavy output of tin plate in a year when other branches of the iron trade were more or less stagnant illustrates the fact, sometimes commented upon, that tin plate is "a poor man's article," and is in demand in bad years as well as in good years. It illustrates another principle; that tin plate is one of the few iron and steel commodities which are actually consumed within a definite and short time after their production. Other forms of iron and steel usually pass into employment; there is a store of them, and the flow of material into the store is influenced by passing conditions more than is the flow of material into ultimate consumption or destruction.

This tin plate production was made under some peculiar influences. The canning crops were almost uniformly a disappointment, being quite considerably below the average; had they been normal the tin plate production would have been much larger, probably exceeding that of 1907. That would have been a curious outcome, considering financial and industrial conditions, but the chance of the calendar made it that these very conditions tended to detract from 1907 production and add to 1908 production.

Normally a great deal of tin plate is called for in the closing weeks of the year which is not actually required for immediate use. Obligations are entered into by consumers during the fourth quarter in order that they may be assured of a supply in the spring, when pressure is heavy on the mills. In the fourth quarter of 1907 there was such uncertainty that these obligations were not entered into, and tin mill operations in the quarter were but little more than half the average of the last quarters in the three preceding years. The demand was not lost; it was merely postponed, and the chance of the calendar put it into a different year, although it belonged to the same season in any event. This postponement of demand and the shortness of many crops probably came not far from balancing each other. They were fortuitous circumstances.

Estimates of Production.

The estimate of 475,000 gross tons of tin and terne plate production in 1908 and the estimate here made of about 465,000 gross tons of black plate production are based upon comparisons of tin mills activity during the year and are in no respect based upon estimates or other data of manufacturers. Similar estimates made in this connection a year ago, for the year 1907, proved to be in error by less than 2 per cent. in the case of black plate and by less than 4 per cent. in the case of tin and terne plate. This is by comparison with the official statistics of the American Iron and Steel Association, which, however, did not appear until the latter part of July, when they had been stripped of all but an academic interest by the passage of more than half of the new year. Our estimates of 1906 production, printed January 3, 1907, proved to be 3 to 6 per cent. out, respectively, by comparison with the official statistics, which did not appear until a whole year later.

Production as officially reported for preceding years, with these estimates for 1908 appended, has been as follows:

United States Production of Black Plates and Tin and Terne Plates.

Years.	Black plates. Gross tons.	Tin and terne plates. Gross tons.	Years.	Black plates. Gross tons.	Tin and terne plates. Gross tons.
1894.....	52,359	74,260	1902.....	365,743	360,000
1895.....	129,615	113,666	1903.....	490,652	480,000
1896.....	185,387	160,362	1904.....	472,569	458,000
1897.....	271,886	256,598	1905.....	507,587	493,500
1898.....	345,254	326,915	1906.....	576,079	577,562
1899.....	375,000	360,875	1907.....	504,072	514,775
1900.....	315,000	302,665	1908.....	*465,000	*475,000
1901.....	398,026	399,291			

* Estimated.

It will be observed that since the great jump in tin plate production in 1903 there has been relatively little variation in the output from year to year, except that the production in 1906 was particularly large. That excessive production was due in part to the chance of the calendar, as there were on an average more tin mills operated in the fourth quarter than in any other quarter of the year, and it is well known that the actual demand for consumption is not large in that quarter. While there is a drop in calendar year production from 1906 to 1907 of more than 60,000 tons, it is probable that the tin plate actually consumed in the respective seasons showed little variation. The average number of tin mills in operation by quarters is given in a table below, in part reprinted from previous reviews. For the earlier years the averages do not pretend to be exact, but are believed to be within 10 mills of the truth. For the past two years the averages are closer. The figures refer only to tin mills the product of which is tinned, and do not include various tin mills which are operated as an adjunct in sheet plants:

Average Number of Tin Mills in Operation.

	1904.	1905.	1906.	1907.	1908.
First quarter.....	265	295	270	274	185
Second quarter.....	270	300	260	294	276
Third quarter.....	175	150	265	227	210
Fourth quarter.....	215	170	285	122	176
Year.....	231	229	270	229	212

The relative activity of the leading interest and the independents in the past two years is shown in the next table. It will be noted that a somewhat larger proportion of the total production was made by the independents in 1908 than in 1907, while it can be observed also that the trade of the independents is of a steadier nature, from quarter to quarter, than is that of the leading interest. This is naturally to be expected from the more miscellaneous nature of the independent business, while a large portion of the leading interest's business is in tin plates for the principal can producer:

Average Number of Tin Mills Operated by the American Sheet & Tin Plate Company and by Independents.

	1907.		1908.	
	American.	Independents.	American.	Independents.
First quarter.....	215	59	142	43
Second quarter.....	231	63	207	69
Third quarter.....	163	64	145	65
Fourth quarter.....	72	50	109	67
Average.....	170	59	151	61

Prices of Tin Plate and Its Raw Materials.

Tin plate prices were almost devoid of fluctuation in the year. Effective January 6 the price per box for 100-lb. cokes, Pittsburgh, was reduced from $3.90 to $3.70,

these prices being subject to the usual 5-cent rebate, and based on 30-day terms, less 2 per cent. for cash in 10 days. This ruled as the official price throughout the year. For a very short period, about the beginning of the fourth quarter, there was slight shading, amounting to perhaps 5 cents a box. Otherwise the market was firm for the entire twelvemonth and came close to making a record for steadiness in the history of the industry.

The spread between prices of raw material and finished product in the tin plate industry has shown relatively little variation in the past two years, but has on the whole been a trifle larger than the average of previous years.

In 1906 there were four advances in tin plate—January 8, 10 cents per box; April 9, 10 cents; May 18, 15 cents, and October 25, 15 cents—the entire advance being $3.40 to $3.90. Sheet bars advanced in that year from $26 per gross ton in the first quarter to $30 in the last quarter. Pig tin averaged 36.49 cents per pound in January and 36.48 cents in February, the low months; 43.36 cents in May the high month, and 42.80 cents in December. From January to December pig tin advanced 6.31 cents per pound, equal to, say, 15 cents a box, and sheet bars $4 per ton, equal to, say, 20 cents a box, a total of 35 cents, against 50 cents advance in tin plate, a gain of 15 cents in the spread. A portion of this was probably taken up by increased cost of other supplies.

In 1907 there was no change in the price of tin plate, which remained at $3.90 per box. There was practically no change in the price of sheet bars. In the first half the market was uniformly $30 per ton, while in the second half $31 was asked, but a number of mills had covered at $30. From the average of $42.80 per pound in December, 1906, the monthly average of pig tin did not vary by as much as 2 cents either way until August, when a steady decline began which carried the market to a low point of 26 cents the middle of December. For the first nine months of 1907 it could be considered that the spread remained about the same as it was when the $3.90 price was established in October, 1906.

The position in January, 1908, when the reduction was made from $3.90 to $3.75 per box, was that pig tin averaged 27.53 cents per pound for the month, while sheet bars were $29 per ton. As compared with the condition at the end of 1906, pig tin was 5.27 cents lower and sheet bars $1 lower, equivalent to a trifle over 15 cents a box, so that the new price involved substantially the same spread as the old one.

The movement in raw materials since last January has been very simple. Tin advanced 4.33 cents per pound to an average of 31.86 cents in April, and then declined about 2.66 cents to an average of about 29.20 cents in December, being about 1.67 cents higher in the closing than in the opening month. Sheet bars, on the other hand, declined about $2 a ton, the reduction occurring in June. An exact comparison cannot be made, because the $29 price of sheet bars at the beginning of the year was $29, Pittsburgh, plus regular freight to destination, while the $27 price is a basing one, the actual delivered price being $27.50 to Pittsburgh and contiguous points, while half the freight is added to more distant points.

The spread has decreased by about 4 cents a box on account of pig tin, and has increased by about 10 cents a box on account of sheet bars. The present price of tin plate represents practically the same spread above pig tin and sheet bars that has prevailed for two full years. The variations have been smaller, probably, than have ever before occurred in any such period, and there is absolutely no argument in the present alignment for either an advance or a decline in the price of tin plate.

Sheet Price Changes.

Only one change in official prices of sheets was made—namely, January 6. The old and the new prices at Pittsburgh were as follows:

	Cents per pound.	
	Old.	New.
Black sheets	2.60	2.50
Galvanized sheets	3.75	3.55
Blue enameled	1.85	1.80
Painted, corrugated	1.85	1.75
Galvanized corrugated	3.25	3.10

The market was subject to some shading at times during the year, particularly in the summer and fall, but the concessions generally did not exceed $1 per ton on black sheets and $2 per ton on galvanized. Toward the close of the year the market became firmer.

At the time of the price change in sheets, January 6, a slight change was made in differentials, gauges 29 and lighter being reduced an extra 5 cents per 100 lb. in black and 10 cents in galvanized.

A change of 1 cent a pound in the price of spelter affects the cost of making galvanized sheets by about 15 cents per 100 lb. in the case of 28 gauge, but by only half as much in the case of 21 gauge. Relations are sometimes sought to be developed between the price of spelter and the price of galvanized sheets, but the market has not been moving in accordance with such relations, being much more affected by the question of supply and demand. When the demand for sheet products is heavy galvanized sheets become scarcer than black; when the demand is light, mills make greater concessions on galvanized than on black.

On January 24, 1907, an advance was made in galvanized sheets from 3.65 to 3.75 cents per pound, without a corresponding advance being made in black sheets, and making the spread between black and galvanized $1.15 per 100 lb. The spread had been $1.05 since November 15, 1904, prior to which date it had been $1. In 1903 and 1904, with a spread of $1, spelter averaged about 5 cents per pound at East St. Louis. In 1905 and 1906, with a spread of $1.05, the spelter market averaged about 6 cents. In the first three months of 1907, when the spread was increased to $1.15, the spelter market was about 6¾ cents. Then there followed a steady decline to about 4 cents at the beginning of 1908, and on January 6 the spread was reduced to $1.05. The spelter market advanced to 4.80 cents in February, declined to 4.30 cents in July, and then advanced, averaging 5 cents in December. There is not much to be got out of such comparisons, the main point observed being that when the spread between black and galvanized sheets is increased on account of a high price for spelter the metal declines, and when the spread is reduced on account of a low price for spelter the metal promptly advances.

The Statistics of the Production of Sheets.

For 1905 and subsequent years the American Iron and Steel Association has presented separate statistics of the production of sheets, 13 gauge and lighter. The tonnage reported, which includes black plate, have been as follows:

Sheet Production, Including Black Plate.

	Iron.	Steel.	Total.
	Gross tons.	Gross tons.	Gross tons.
1905	62,134	1,428,890	1,491,024
1906	51,040	1,599,564	1,650,604
1907	43,761	1,545,011	1,588,772

Deducting from these totals the production of black plate reported the following remains as the tonnage of sheets alone:

Sheet Production, Excluding Black Plate.

	Gross tons.		Gross tons.
1905	983,437	1907	1,084,700
1906	1,074,525		

It would be difficult to estimate closely the production in 1908. It has been in the neighborhood of 700,000 tons, but may have been materially less than that.

A question is often asked as to what proportion of the total output is made by the leading interest, and it can be stated that in both 1906 and 1907 the proportion of the leading interest was about 57 per cent., which represented quite an increase from 1905, when the proportion was only about 52 per cent. The leading interest increased its production from 1905 to 1906 by more than 20 per cent., while the independents fell back a trifle, or from about 475,000 tons to about 465,000 tons, while in 1907 they made about 470,000 tons.

There is quite a difference in the character of the output of the leading interest and of the independents. The independents finish into corrugated roofing, eaves trough and conductor pipe, stove pipe, lath, ceiling and siding, &c., a much greater proportion of their output than does the leading interest, and accordingly as a factor in the market for flat sheets the leading interest is correspondingly prominent. It galvanizes more of its

product than do the independents, and the proportion of galvanized material is increasing each year. In 1905 about 37½ per cent. of the sheet tonnage of the leading interest was galvanized, while in 1907 and 1908 the proportion was slightly above 40 per cent.

New Sheet Mill Erection.

The American Sheet & Tin Plate Company increased the number of mills in its sheet department by seven during the year, or from 179 to 186. At the Ætna-Standard plant one sheet mill was added, at the Guernsey plant four sheet mills were added, and at the New Philadelphia plant one sheet mill was added and one jobbing mill. At the Wellsville plant there was a change in classification whereby one sheet mill was changed to a jobbing mill. Thus during the year the company's sheet mills increased from 171 to 176 and its jobbing mills increased from six to eight, while the number of light plate mills remained at two.

The independents have been steadily increasing their capacity in the past two years by the addition of mills at existing plants, while some new plants have been built. In 1907 the Seneca Iron & Steel Company at Buffalo, N. Y., and the La Belle Iron Works, at Steubenville, Ohio, completed new sheet plants. At the present time new sheet plants are being built at Mansfield, Ohio, by the National Sheet Steel Company, and at Massillon, Ohio, by another interest. The Berger Mfg. Company, at Canton, Ohio, is engaged in adding 10 mills to its plant, and will have about half of the new mills running within a short time.

Following is a list of actually operative sheet mills at the close of 1908, mills building and some mills which have not operated lately not being included:

Independent Sheet Plants.

	Mills.
Allegheny Steel Company, Brackenridge, Pa. (including Interstate Steel Company)	14
American Rolling Mill Company, Middletown, Ohio (including Zanesville, Ohio, plant)	10
Berger Mfg. Company, Canton, Ohio	11
Canonsburg Steel & Iron Works, Canonsburg, Pa.	5
Empire Iron & Steel Company, Niles, Ohio	6
Follansbee Bros. Company, Follansbee, W. Va	2
Job Iron & Steel Company, Ashland, Ky	6
Inland Steel Company, Indiana Harbor, Ind	10
La Belle Iron Works, Steubenville, Ohio (including two jobbing)	10
Lalance & Grosjean Mfg. Company, Harrisburg, Pa.	1
Marshall Iron Company, Newport, Del	2
McCullough Iron Company, Wilmington, Del	4
National Enameling & Stamping Company, St. Louis, Mo. (including four at Granite City)	10
Newport Rolling Mill Company, Newport, Ky	10
Niles Iron & Steel Company, Niles, Ohio	6
Parkersburg Iron & Steel Company, Parkersburg, W. Va.	9
Portsmouth Steel Company, Portsmouth, Ohio (jobbing mill)	1
Seneca Iron & Steel Company, Buffalo, N. Y.	7
N. & G. Taylor Company, Cumberland, Md. (jobbing)	2
Whitaker-Glessner Company, Wheeling, W. Va. (including six at Martin's Ferry, Ohio)	13
Alan Wood Iron & Steel Company, Conshohocken, Pa.	8
J. Wood & Bros. Company, Conshohocken, Pa	4
Youngstown Iron & Steel Roofing Company, Youngstown, Ohio	6
Youngstown Sheet & Tube Company, Youngstown, Ohio	6
Zug Iron and Steel Company, Pittsburgh, Pa	6
Total	169

The American Sheet & Tin Plate Company's Plants.

	Sheet.	Jobbing.	Light plate.
Ætna-Standard, Wheeling, W. Va	17	5	1
Canton, Canton, Ohio	5	..	..
Dover, Canal Dover, Ohio	11	..	..
Dresden, Dresden, Ohio	4	..	..
Guernsey, Cambridge, Ohio	11	..	..
Hyde Park, Hyde Park, Pa	6	..	..
Leechburg, Leechburg, Pa	11	..	..
Mercer, Sharon, Pa. (also continuous mill)	5	..	..
Midland, Muncie, Ind	7	..	..
New Philadelphia, New Philadelphia, Ohio	10	2	..
Old Meadow, Scottdale, Pa	8	..	..
Piqua, Piqua, Ohio	4	..	..
Saltsburg, Saltsburg, Pa	4	..	..
Scottdale, Scottdale, Pa	9	..	..
Struthers, Struthers, Ohio	6	..	..
Vandergrift, Vandergrift, Pa	37	..	..
Wellsville, Wellsville, Ohio	9	1	..
Wood, McKeesport, Pa	12	..	1
Total (186 mills)	176	8	2

Operative Tin Mills.

There has been no important new erection of tin plate plants for some time. The total number of tin mills varies slightly from time to time, an occasional plant being dropped from the active list, while occasionally tin mills are converted into sheet mills and *vice versa*. In the list of independents given below two plants are omitted, as they have not operated for some time. It will be noted that the total number of tin mills listed below does not correspond at all with the number of tin plate mills previously given as operating at various times. The Niles and Atlanta plants have no tin houses, while the Granite City plant is estimated not to tin the product of more than half a dozen mills. In the summary of tin plate mills operating only those plants which actually tinned their product at the point of production are included:

Independent Tin Mills.

	Mills.
Alcania Company, Avonmore, Pa	3
Atlanta Tin Plate & Sheet Mill, Atlanta, Ind	4
Carnahan Tin Plate & Sheet Company, Canton, Ohio	6
Follansbee Bros. Company, Follansbee, W. Va	6
Griffiths Charcoal Iron Mills, Washington, Pa	2
Lalance & Grosjean Mfg. Company, Harrisburg, Pa	4
McKeesport Tin Plate Company, McKeesport, Pa	10
National Enameling & Stamping Company, Granite City, Ill.	20
Niles Iron & Steel Company, Niles, Ohio	1
Phillips Sheet & Tin Plate Company, Clarksburg, W. Va.	8
Pope Tin Plate Company, Steubenville, Ohio	12
Standard Tin Plate Company, Canonsburg, Pa	6
N. & G. Taylor Company, Cumberland, Md.	8
Washington Tin Plate Company, Washington, Pa	5
Whitaker-Glassner Company, Wheeling, W. Va	5
Total	100

The American Sheet & Tin Plate Company's Mills.

	Mills.
American, Elwood, Ind	28
Anderson, Anderson, Ind	7
Cambridge, Cambridge, Ohio	7
Chester, Chester, W. Va	7
Crescent, Cleveland, Ohio	6
Greer, New Castle, Pa	20
Humbert, Connellsville, Pa	6
La Belle, Wheeling, W. Va	10
Laughlin, Martin's Ferry, Ohio	23
Monongahela, Pittsburgh, Pa. (also continuous mill)	8
Morewood, Gas City, Ind	8
National, Monessen, Pa	25
Pennsylvania, New Kensington, Pa	8
Pittsburgh, New Kensington, Pa	8
Sabraton, Morgantown, W. Va	10
Sharon, Sharon, Pa	20
Shenango, New Castle, Pa	30
United States, McKeesport, Pa	11
Total	242

Increased Outputs Per Mill.

The large increase in the production of both sheets and tin plates in the past few years has not been accomplished merely by increasing the number of mills. The increase has rather been on account of individual mills getting out larger tonnages. In 1905 the limit of output in union tin mills was removed, and since then the limit in sheet mills has been removed. Besides this the mills have been made heavier and the attendant equipment has been improved. Occasionally there have been decreases in the total number of mills in a given branch, as may be observed in the table below, which is reproduced from previous summaries:

Number of Operative Mills at Close of Year.

	Sheet.		Tin plate.	
	American.	Independent.	American.	Independent.
1902	164	136	264	71
1903	164	155	264	71
1904	163	170	242	83
1905	171	130	248	109
1906	171	130	255	110
1907	179	148	242	110
1908	186	169	242	100

This table aims to give the number of operative mills at the close of each year, not dropping any plant unless it has not been operated for quite a long time.

The Meehan Boiler & Construction Company, Lowellville, Ohio, has received the contract for repairing Ella Furnace of Pickands, Mather & Co. at West Middlesex, Pa., work on which has already started, and is rebuilding Fannie Furnace of the United Iron & Steel Company, also at West Middlesex, Pa. The latter stack has been raised 10 ft.

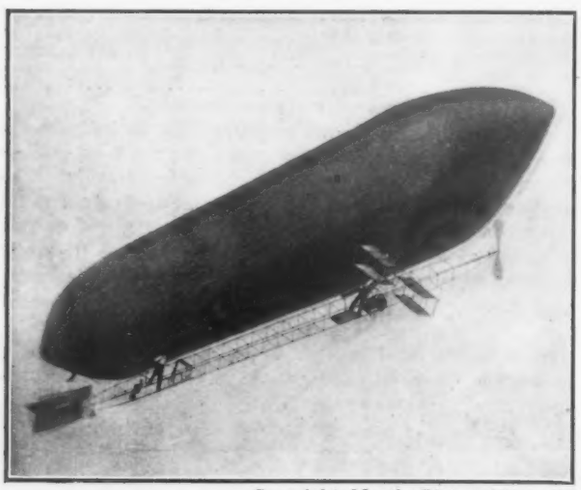
THE CONQUEST OF THE AIR.

BY J. F. SPRINGER, NEW YORK.

The earth's radius is approximately 4000 miles. Above the terrestrial surface is an atmosphere for probably 100 miles. There is, thus, continuity of matter from the center of the earth for a distance of about 4100 miles, but there is very little of this realm that has been actually visited by men. Balloons have ascended about five miles. Mines have penetrated to lesser depths. Indeed, the whole of the earth's surface has not been explored. It can hardly be said, consequently, that man has been very successful in making an absolute conquest of the realm of matter in which he has been placed.

It is true that he has progressed very considerably in the matter of surface transportation. The performances of the 18-hr. trains between New York and Chicago, and of the Lusitania and Mauritania on the Atlantic bear evidence of this. But even in this matter of surface transportation the limitations are quite of a conspicuous character. Railroad trains are confined to tracks—even automobiles and bicycles are restricted to roads and the like. The most trifling thing may operate as a complete bar—the want of a few feet of rail, the presence of a narrow ditch, may be sufficient. On the ocean there is but little difficulty in going anywhere—except into high latitudes and in the vicinity of the shores. In such portions of the sea there may be insufficient depth of water or channels may be too narrow. There has been some success in going below the surface of the water. However, we can hardly say that the conquest of the opean depths is complete.

As to the ocean of air—man has longed to make himself master of it. He has felt himself urged in this direction, no doubt, from the fact that creatures much below him in muscle and intellect navigate it. He sees a little creature, which he is able to inclose in one of his hands, move at will hither and thither in the air. Just as the evident success of the fish in the sea, so the mastery of aerial navigation by the bird is a constant reminder that victory is not by any means an impossibility. To the incentive supplied by the birds, then, we may ascribe the wonderful persistence with which men have worked at the problem of aerial transportation.



Copyrighted by the Pictorial News Co.

Fig. 1.—Captain Baldwin's Dirigible Built for the United States Government.

Early History.

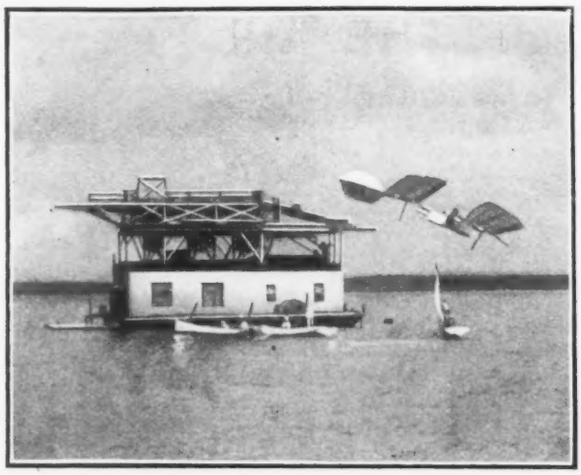
The Chinese are said to have sent up a balloon in honor of the coronation of one of their emperors in 1306. About the year 1500 the distinguished painter, Leonardo da Vinci, designed a couple of contrivances of the nature of attachments whereby the human body was to be supplied with winglike appurtenances. This celebrated artist does not seem, however, to have gone beyond the pictorial stage. Another proposal—and one which contains the germ of the balloon idea—was that of Francisco de Lana. His design contemplated the use of four large spherical shells of metal within which he might produce a vacuum by first filling them with water from above and then permitting the water to flow away through a tap at the bottom. His idea was that four spheres, each containing a vacuum, would, if attached to a car, exert a levitating power upon it and a mast and sail were to give horizontal transportation as well. To provide against a too sudden rise of this airship the car was to be ballasted with weights that could be thrown out as desired. While the scheme failed because the water would not run out when the taps were opened, the principle of the lifting power of a vacuum was correct, but a shell strong enough to withstand the external and unbalanced atmospheric pressure would weigh much more than the quantity of air removed. Another thing which operated against the vacuum idea was the difficulty of producing the vacuum itself.

Courtesy of the Scientific American.

Fig. 2.—The English Dirigible Nulli Secundus.

Then came the idea of replacing the air with another gas, lighter in weight; the same effect of opposition to gravitation would be produced, and a counterbalancing pressure supplied to offset that of the external atmosphere, making a stiff container for the gas unnecessary. Probably the Montgolfier brothers, Stephen and Joseph, did not perceive these matters with clearness, but they hit upon the utilization of hot gases from burning materials. After some discouragement they succeeded in filling a balloon of considerable size, 700 cu. ft., and had the pleasure of seeing it rise nearly a quarter of a mile. A public exhibition was held in the summer of 1783, when they succeeded in sending up to a hight of about 1000 ft. a large balloon 35 ft. in diameter. This had been filled with heated air. It soon fell, but the general principle had been proved to the world.

The scientist Charles, knowing that hydrogen gas was much lighter than air, proceeded to utilize it as the inflating substance. His balloon, 13 ft. in diameter, rose to a considerable hight, astonishing a Parisian crowd of a



Courtesy of C. M. Manly.

Fig. 3.—Langley's Machine Diving Into the Potomac River.

quarter of a million people. This was subsequent to the public experiment of the Montgolfier brothers, but during the same summer of 1783. In September a large Montgolfier balloon was sent up from Paris. To this was attached a car containing a sheep, a duck and a rooster. This was no doubt the first balloon ascension of living creatures.

Balloons and Dirigibles.

The balloon may then be said to be a century and a quarter old. As far back as 1862 Glaisher and Coxwell made an ascension of about five miles. In 1894 Professor Berson ascended to a hight somewhat greater than this. These cases are sufficient to show the great efficiency of the balloon as a lifting agent.

The Montgolfier method of heating the inflating substance is not now utilized except in toy balloons. The lifting power of heated air is not only much less than that of hydrogen and coal gas, but the necessity of maintaining the heat is dangerous. Furthermore, the limit of its ascensional power is soon reached. There can be no question of the high efficiency of the balloon when considered merely as a means of rising in the air. The balloon, however, is an unwieldy sphere practically at the mercy of every atmospheric current. It has no means of horizontal motion except that supplied by the winds. It is quite true that by rising and falling the balloonist is able to fall in with a variety of currents. By taking advantage of these he may be able to control to some extent the direction and velocity of his horizontal movement, but this control is so extremely limited that it is highly unsatisfactory.

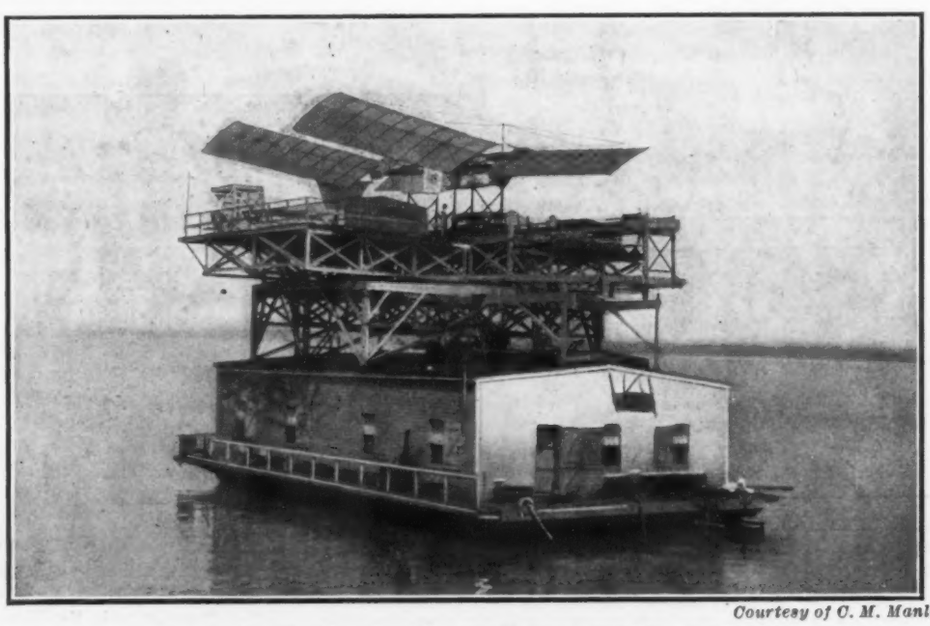
In late years the development of the dirigible balloon has met with considerable success, discarding the spherical form for a shape somewhat similar to that of a cigar, to reduce the resistance of the air in the direction of locomotion. Further, it is necessary to maintain the form. This is accomplished by the use of an air chamber. This may be simply a bag located within the main body of the balloon. If the balloon envelope shows signs of contraction of the interior gas, due to a fall of temperature or other cause, the air chamber is mechanically inflated until the form is restored. By withdrawing air from the chamber, an opposite effect may be attained. This device dates from the early days, and is to be regarded as of cardinal importance in connection with dirigible balloons.

It was also pointed out long ago that the car must be rigidly attached to the balloon. With the ordinary spherical nondirigible the car is loosely attached. All the advance of recent years has centered around two important problems—means of getting a forward motion independent of air currents, and means for maintaining equilibrium and controlling the course. Propulsion is ordinarily effected by a propeller operated by an engine. The action of the propeller is similar to that used with steamships, but its blades are much larger. The great question is the generation of the considerable power required with an immense surface presented to the resistance of the air. This is emphasized by the fact that the propeller operates in a very mobile substance, so that a high velocity is necessary. It is easy enough to build an engine capable of developing the power; the problem is its weight. Dirigible balloons owe the success which they have attained largely to advances made in light weight engine construction.

Count von Zeppelin's airship of 1905 had two motors each weighing 800 lb. and developing 85 hp. (9½ lb. per horsepower). The Wright brothers used in 1903 (with an aeroplane) a gasolene motor weighing with all accessories about 200 lb. and developing about 12 to 14 hp. (15 lb. per horsepower). Another motor of theirs, used in 1905, weighed 13 lb. or less per horsepower. In comparing these figures with those given in connection with Count von Zeppelin's balloon it should be remembered that in the one case water, fuel, &c., are included. It is uncertain whether such is the case with the Zeppelin figures. Charles M. Manly built in 1901 an engine for one of the Langley machines which apparently still holds the record as the lightest engine per horsepower. It weighed 125 lb. and developed 52 hp. This is less than 2½ lb. per horsepower.

For control of direction the principal means relied upon is the rudder. This is much the same as the device used with ships. There are various styles of fins and protuberances which are thought by their inventors to supply a steadying influence.

The dirigible balloon is apparently capable of development to the point of reasonably safe and efficient opera-



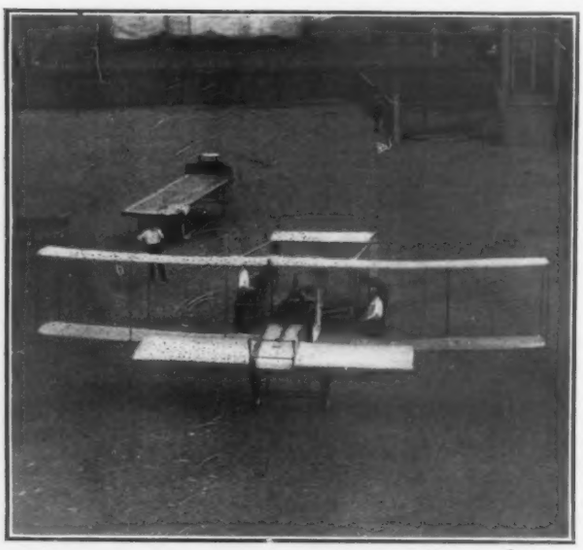
Courtesy of C. M. Manly.

Fig. 4.—The Floating Launching Platform for Langley's Aeroplane.

tion, but it will always be unwieldy because its buoyancy depends upon its bulk as compared with its weight. As for its advantages, its certain ascensional power is important, and a balloon which pauses in midair is not necessarily imperiled like an aeroplane. If the motor breaks down or some other accident occurs involving the shutting off of the power the balloon still preserves its buoyancy.

Recent Successful Airships.

Among the most recent balloon airships may be mentioned the German Zeppelin IV.,* the French Republique,* the Baldwin dirigible* purchased by the United States Government, Fig. 1, and the British Nulli Secundus* (Second to None), Fig. 2. The first of these, the Zeppelin IV. perished last year. It was of the most rigid type, the balloon being built upon a strong framework. The envelope was not, as is the case with most balloons, of silk or other fabric, but of thin aluminum which had the advantage of being weldable in case of damage. The length was 466 ft. and the diameter nearly 46 ft. It required for its inflation nearly half a million cubic feet of gas. Before its accidental demolition it made a flight of about 250 miles and was free of any support for half a day. Propulsion was secured by two twin propellers each operated by a 120 hp. engine. The Republique is much smaller, its length being 200 ft. and its diameter about



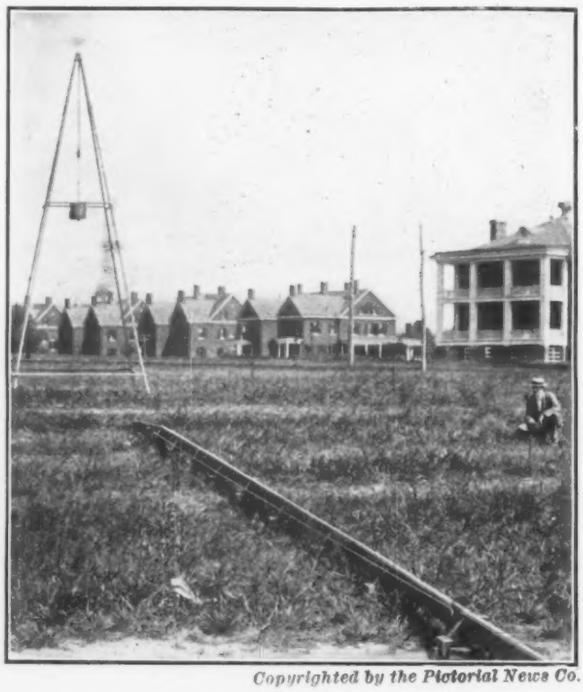
Copyrighted by the Pictorial News Co.

Fig. 5.—Farnam's Aeroplane.

34 ft., and the volume of gas required one-half that necessary for the Zeppelin IV., and its engine a single one of 60 hp. The American dirigible designed by Captain Baldwin is of moderate size, but seems to be an efficient balloon, and has two aeroplanes located forward. Upon descending these may be tilted downward and assist in accomplishing the descent. A dragrope is also used. This simple device is an important adjunct to a balloon and has long been in use. When alighting, a dragrope, the moment its lower end begins to rest on the ground, relieves the balloon of weight, retarding its ascent. On the other hand, as the balloon ascends and consequently withdraws weight from the ground it is similarly retarded, thus the dragrope acts as a kind of governor. The Nulli Secundus is also a moderate sized airship, and is fitted with a 50-hp. motor. There are two propellers at either side of the car, which is suspended beneath the center of the balloon body. This dirigible has made headway against a wind of 15 miles per hour.

The dirigible balloon of Major Parseval consists of a long cylindrical body. To this are fitted collapsible surfaces which project radially, somewhat after the manner of fins from the rear end of the balloon. These are inflated under pressure and assist in giving stability. There are two air compartments within the body, one at each

* More complete descriptions of these dirigible balloons were given in the paper by Major G. O. Squier, U. S. A., printed in *The Iron Age*, December 10 and 17, 1908.



Copyrighted by the Pictorial News Co.

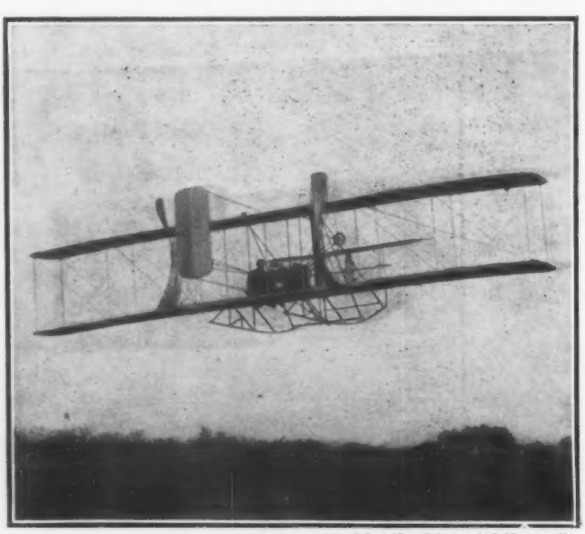
Fig. 6.—Apparatus for Starting the Wright Aeroplane.

end. By suitably controlling these the levitation of the two ends of the balloon may be made to differ. In this way vertical steering may be accomplished.

Mechanical Flight.

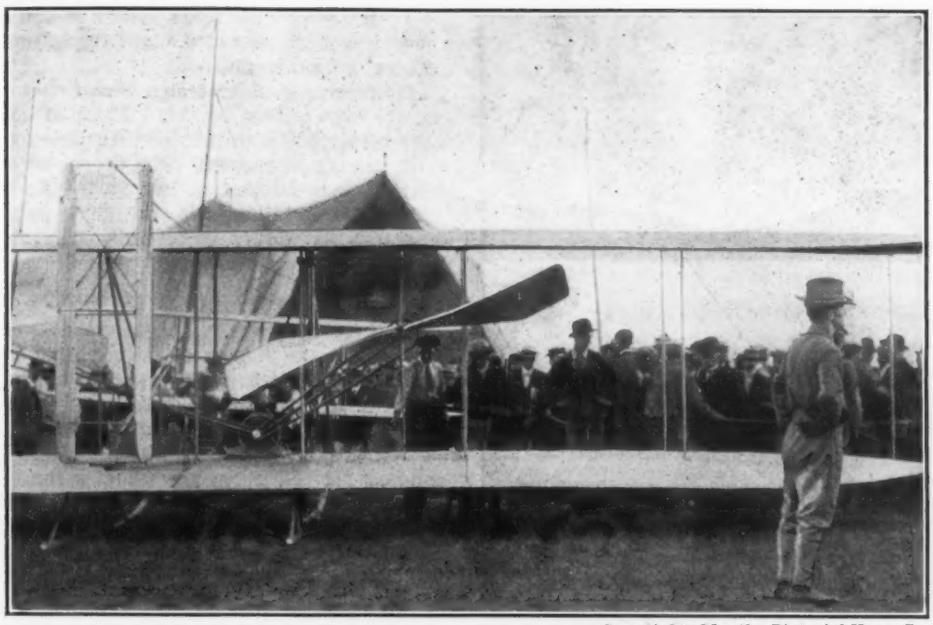
As has already been noted, the great asset of the balloon is its ability to remain in the air independently of any forward motion. There can be no question of the extreme value of this quality. At the same time we do not find it in nature. Birds are not lighter than air, and consequently are unable to remain in quiescence in midair. A bird rises and maintains itself above the surface of the earth upon some totally different principle, although it is possible that men at one time thought that a bird had the ability to make itself lighter than air.

Prof. S. P. Langley had the opportunity of witnessing the initiation of the flight of an eagle. There was a considerable run forward and a gradual rise in the air marked by the increasing faintness of the toe marks in the ground. This is the usual method adopted by aeroplanists—*i. e.*, to get up a very considerable speed before attempting the ascent proper. But this is not the only method of initiating flight disclosed to us by birds. Octave Chanute cites from Charles Weyher an account of a flight witnessed by him. A sparrow hawk emerged from a hole on the leeward side of an aqueduct when a strong wind was blowing perpendicularly against it. Instead of



Copyrighted by the Pictorial News Co.

Fig. 7.—The Wright Aeroplane in Flight.



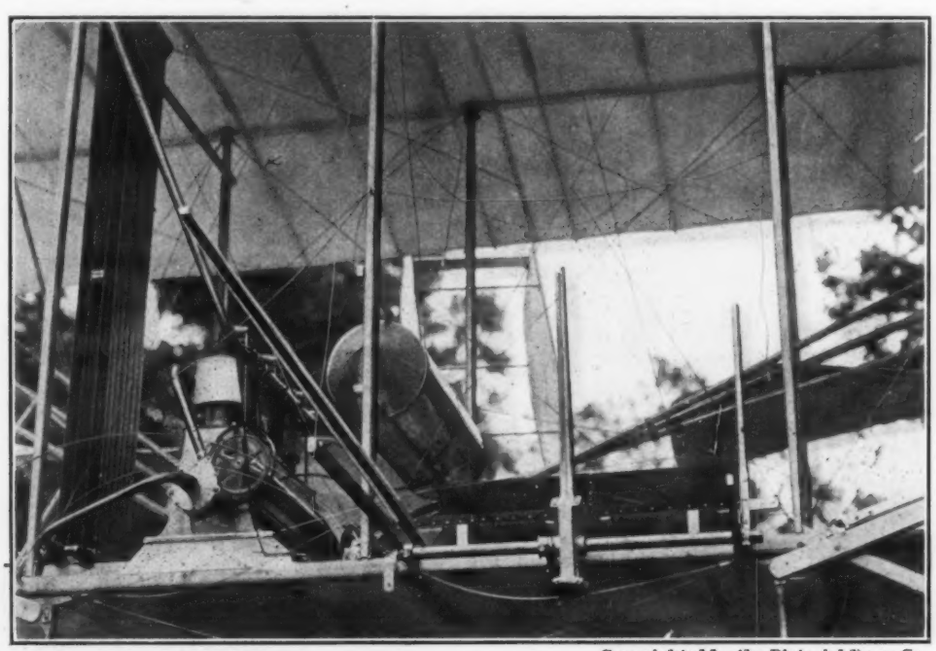
Copyrighted by the Pictorial News Co.

Fig. 8.—A View from the Rear of the Wright Aeroplane.

flapping its wings and rising at once into the air, the bird first dropped downward, catching the wind, and then made a vertical curve, going with the wind. Next, by a wonderful series of spiral loops, it rose into the air, its motion being now with, now against the wind. Three things were noticed—the bird had a motion of its own before encountering the wind at all; it had attained a considerable impetus before beginning its ascent, and the return to the hole in the aqueduct was made against the air current.

To get a start, it would seem immaterial whether a run is made along a level or down an incline or a drop from a hight. This matter of getting under way has been pretty assiduously investigated. In this connection Lilienthal deserves conspicuous mention. From a boy he seemed fascinated with the idea of flying or gliding. He arranged wings for himself and sought to get under way by running down an incline. Continuing his experiments, he was able ultimately to glide for a considerable distance through the air supported by a winglike device. If the wind were considerable he would, sometimes at least, be able to fly along above the watchers below. If the wind was insufficient for this he would only succeed in hovering in the air. One of his gliding machines had an area of about 150 sq. ft., another extended the area to 194 sq. ft. Equilibrium was maintained by movements of his body, which from the great difficulty he often experienced, especially in alighting, appears to be a poor method. It would seem better to devise a mechanical means that would be both automatic and extremely sensitive. Lilienthal ultimately built a hill, 50 ft. high, from which to make his starts and devised a rudder controlled by the head. His death occurred, however, through some derangement or mistake during an experiment when he was 50 ft. in the air, his machine capsizing and falling to the ground. It will be remembered that a similar accident happened with one of the Wright machines, which resulted in serious injury to Orville Wright and in the death of his companion, Lieutenant Selfridge, a United States Army officer. This latter machine was motor driven.

These casualties emphasize the great and conspicuous defect of the heavier than air machines. So much dependence is put upon forward motion and accurate adjustment of planes in order to secure maintenance in the air or to keep equilibrium, that a slight accident to the motor or a trifling error of judgment in manipulation of planes is sufficient to produce disaster. What is needed with all these machines is some means of coming to a stop in the horizontal movement without danger of falling



Copyrighted by the Pictorial News Co

Fig. 9.—The Engine and Control of the Wright Aeroplane, Front View

Copyrighted by Edw. Levick, N. Y.

Fig. 10.—The June Bug Starting from the Ground.

or capsizing, means of preventing capsizing from slight accidents to aeroplane surfaces and small errors of manipulation and means of preventing a fatal fall when some unexpected slight accident occurs. The balloon has its parachute, an eminently important accessory. The ordinary parachute could, however, scarcely be relied upon to be as efficient with the heavier than air machine as it is with the balloon. If the balloon envelope bursts open, setting free the gas, or is violently exploded by a stroke of lightning, there is usually a few moments' delay or a slow descent of the balloon itself, which gives an opportunity to get off with the parachute. But if a heavier than air machine goes wrong it is at once precipitated downward. Some means of getting free of the entire machine and remaining behind for a slow descent is what might be expected to meet the difficulty. Perhaps the machine itself could be so designed that the operator and companions would always be able to get free from it on the sky side, notwithstanding an overturn or other derangement of position. If, in addition, parachutes could be at hand upon the same side, it would seem that the occupants of an aeroplane might then be as safe as those making balloon ascents.

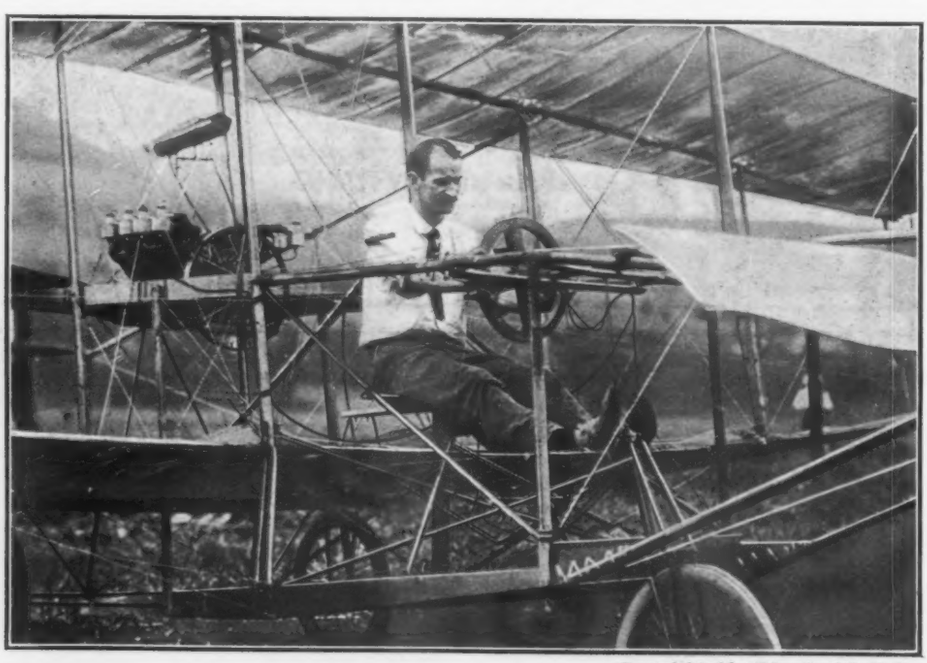
However, aeroplane design is moving on without waiting for such safety devices. Repeated sustained flights have been made with heavier than air machines and carrying human passengers. The areoplane is not the only heavier than air device, but it is—if we include the gliders such as Lilienthal's—the only type which has demonstrated its ability successfully to transport in free flight a human passenger.

Langley's Experiments.

Prof. S. P. Langley, an American scientist, is to be regarded as the pioneer in the scientific investigation of the aeroplane. It had of course been known for ages that a more or less flat surface could be levitated if held at the proper angle to an air current. This has been familiar as long as there have been kites. Professor Langley formulated his celebrated law that, within limits, a high speed may be obtained with an aeroplane with less power than a low one. The reason for this paradoxical law is that with a high horizonal speed the surface of the aeroplane may be brought more nearly to the horizontal in effecting a sufficient levitation. It must be remembered that the prime thing in an aeroplane is to keep it in the air. High speeds develop sufficient lifts at such small angles that it is found advantageous to use them. An aeroplane, in fact, should be driven ahead at the rate of not less than about 30 miles per hour.

The word aeroplane really means a planar surface. It is found advisable, however, to make use of slight deviations from a plane. It is proposed to use aerofoil as a general term, including planes and slightly flexed surfaces, and to restrict aeroplane to a strictly flat surface.

With regard to Professor Langley, it is perhaps not too much to say that apart from his example and experimental demonstrations, we should not to-day be witnessing the repeated successes of men like the Wrights, Henry Farman and others. Professor Langley's earlier efforts were most seriously handicapped by the fact that in seeking to supply his devices with motors he was met with the excessive weight per horsepower then necessary. The lightest engines, including boilers, weighed about 75 lb. per horsepower. Such weights were of course prohibitive. However, in 1896, two steam devices were successfully experimented with on the Potomac River, near Washington. The trials with the one model were made on May 6, and are to be regarded as successful. But on November 28, with the other model, even better results were attained. These machines weighed about 60 lb. each and

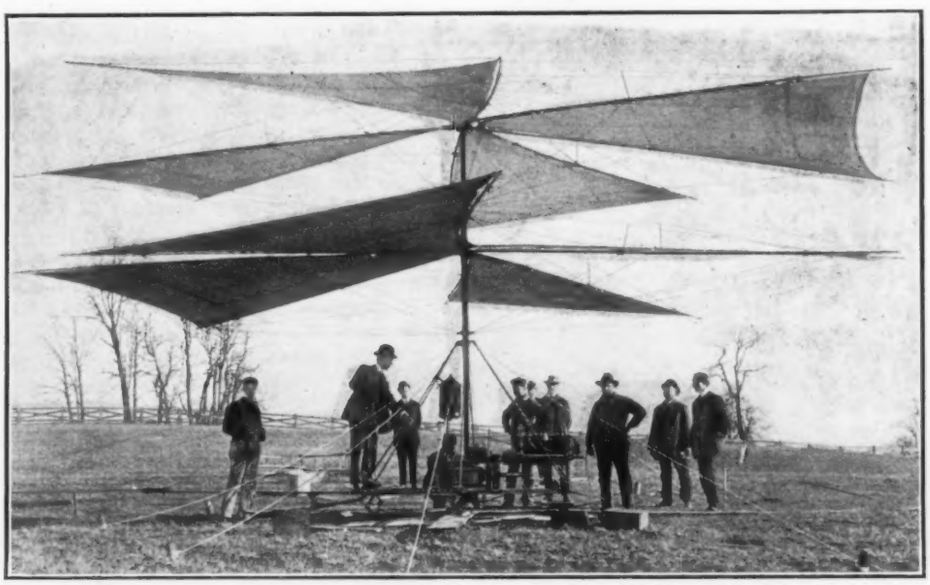


Copyrighted by Edw. Levick, N. Y.

Fig. 11.—Detail of the Engine and Control of the June Bug.

had engines developing about 1¼ hp. The sustaining surface was about 60 sq. ft. for each. No passenger was carried, but a very complete demonstration of the possibility of mechanical flight was afforded. The flights undertaken were limited to less than a mile, to prevent loss of the machines. Apart from the water supply carried, the total weight concerned in the production of the motive power was less than 7 lb. per horsepower.

Some years later Professor Langley, with the assistance of a Congressional grant, developed a man carrying device which was tried on October 7, 1903. Previously, however, a replica of this larger machine was experimented with to determine the proper disposition of the aeroplane surfaces. This experiment was a complete success, and, of course, encouraged a trial with the full sized model. When the trial was made, however, with Chas. M. Manly on board, an accident occurred, resulting in the breakage of the forward wings and the deflection of the machine downward. This accident was due to imperfection in the operation of the launching apparatus. Fig. 3 shows the aerodrome just after leaving the launching boat. Mr. Manly and the machine struck the water at an angle of about 45 degrees and a speed of about 50 miles an hour. The passenger escaped, however, without serious mishap. A second experiment was made later on.



Courtesy of the Scientific American.

Fig. 12.—Luytie's Helicopter.

This, too, resulted unsuccessfully on account of a somewhat similar accident. The aerodrome was injured in such a manner by the workmen and others in handling it subsequently to the fall in the river that it became wellnigh impossible to determine the exact character of the original damage. It is scarcely fair, in view of the intelligent explanations offered, to regard either of these experiments as at all decisive against the practicability of Professor Langley's design. Fig. 4 shows a nearer view of his machine and the houseboat from the top of which it was launched.

At the present time we are in the midst of a whirl of experimentation with aeroplane devices. The greatest enthusiasm and determination are exhibited in dealing with the problem. The successes attained seem to mean that we are entering upon the age of real aerial navigation. Henry Farman in France and the Wright brothers in the United States and France, are to be regarded as the leaders at the present time. Farman's machine is shown in Fig. 5. There are many other inventors working at the problem, and the year just past will be marked as the one when the first public demonstrations of this success took place.

The Wright Brothers' Successes.

The Wrights, living at Dayton, Ohio, had been making many successful experiments, which have been substantiated by the testimony of reliable witnesses. While these experiments are, some of them, a number of years old, the first public flights took place in the summer of 1908. Wilbur Wright, with one of their machines made the first of these in France. Not long afterward Orville Wright gave a public demonstration in the United States with another machine. In the French demonstrations which Wilbur Wright has been making, he, like his brother, first made use of a starting device, shown in Fig. 6, to give the aeroplane a more decided initial impetus than was possible with the propellers alone. However, this was dispensed with in November. In December he made some very notable ascents. In one case he rose over 300 ft. above the ground. It should be remembered that the French experimenters as a rule do not rise to any but very trifling distances above the earth. December 31 he broke all previous records, remaining in the air 2 hr. and 9 min., and covering a distance of probably over 90 miles, winning the Michelin cup.

In the view given in Fig. 7 the surfaces fore and aft are respectively the horizontal and vertical guides. When it is intended to make a flight the machine is arranged on a short single rail track, Fig. 6. The propellers are started and the aeroplane moves off along this track, balanced at first by an assistant who runs along at the side. When sufficient forward speed has been attained the front guide, or rudder, is operated and the aeroplane rises into the air. It is said that at a hight of 100 ft. one experiences scarcely any motion at all. There is of course the wind upon one's face. In making the turn to come back to the starting point the effects of centrifugal force as felt in automobles and the like is wanting. This is perhaps due to the inclination of the seat and a greater radius of curvature. The balancing of such a contrivance is one of the crucial points. What is needed is, as before noted, a highly sensitive automatic means of maintaining equilibrium. At present this *sine qua non* of aerial navigation depends upon the skill of the aviator. It has been thought that by placing the center of gravity very low equilibrium might be maintained with some ease, but this had the effect of producing oscillations. Again, a V-shaped arrangement of the aeroplane surfaces, somewhat in the manner in which birds dispose their wings, seemed to promise some solution. But according to the Wrights this method gives rise to oscillatory movements and is applicable only to still air. The Wright device has been operated in a strong wind (20 miles per hour), and in their hands seems to be highly successful. Figs. 8 and 9 show details of the machine tested at Ft. Myer, Va.*

Other Recent Work.

The Wrights in managing their machines rely some what upon the effects producable by slight flexures of the surfaces. In this connection mention may be made of

* Further details of the experiments with the Wright machines and their details were given in the second installment of Major Squier's paper in *The Iron Age*, December 17, 1908.

the device used in the June Bug, Fig. 10, an American machine. At the end of the parallel surfaces are attached triangular flaps. These are controlled by the aviator, who is able by suitably deflecting them to correct tendencies to a loss of equilibrium. Fig. 11 shows a nearer detail of this machine.

The aeroplane is not the only form of heavier than air machine. The helicopter, Fig. 12, consists of two sets of propeller-like sails. Thus, in the Luyties device, there are four such blades in each set. These are disposed radially about a revolvable shaft, each blade being slightly oblique to the axis of the shaft. The shafts are concentric—one of them, at least, being tubular—and are operated in opposite directions. There has been no free flight of a man carrying heliocopter as yet. Nevertheless, experimentation has been going on, and important advantages are claimed for this method. A large experimental heliocopter, with wings extending 17 ft. from the shaft and operated by a 20-hp. motor exerted a lift of 700 lb. As the apparatus itself weighed 1000 lb., this would have been insufficient in a practical flying machine. The inventor thinks, however, that the experience already gained will enable him to more than interchange the numbers representing weight and lift in a new design. Now it is proposed not only to rise in the air with a device of this description, but to move horizontally. This is to be accomplished by tilting the axis of the heliocopter. This would not necessarily mean tilting the entire apparatus. The inventor seems to believe that quite high speeds in a horizontal direction may be secured by a very moderate obliquity of the axis of the heliocopter. This is a line of investigation that may prove of cardinal importance. It may be observed that rotation of the two sets of propeller blades in opposite directions is necessary in order to neutralize the gyroscopic effect each would otherwise set up as soon as a deflection of the axis took place.

Practical navigation of the air is probably now in sight. Not navigation fraught with frightful perils and only possible to the highly skilled expert, but one of such practicability that slight errors will not count and that it may be accomplished by any intelligent person. This must be brought about largely by the development of automatic means of control. The practical airship must not be subject to destruction of itself or its occupants if slight breakages or other small accidents occur.

In conclusion, it may be well to emphasize again the great desirability of modifying the designs of heavier than air machines so that the occupant may always—whatever overturns the apparatus itself experiences—have opportunity to get free on the sky side, thus enabling them to make use of parachutes. The way to do this may not be at all apparent. But the safety of human life demands either this or an equivalent method of escape from a means of transportation so susceptible to disastrous results from slight accidents.

A Large Tod Blowing Engine.—The William Tod Company, Youngstown, Ohio, has recently furnished to Grace Furnace of the Brier Hill Iron & Coal Company, also at Youngstown, what is said to be the largest blowing engine yet installed in any merchant blast furnace in the country. This engine has some new features. The steam end is horizontal cross compound with cylinders 52-in. and 90-in. diameter and 60-in. stroke. The air ends are 90-in. diameter with 60-in. stroke, and are set vertically, directly over the main bearing of the steam end. The connecting rods from the steam and air ends are connected to a common crank pin on each side, thereby giving the "quarter crank" relative position of steam and air pistons, so desirable in blowing engine work. The whole machine is of very heavy construction, and is designed for high speeds and ease in handling. Its nominal capacity is 52,000 cu. ft. of free air per minute at 60 revolutions per minute, against a normal blast pressure of 18 lb. per square inch and a maximum pressure of 25 lb. per square inch. The engine is designed for a maximum speed of 75 revolutions per minute, which would give 25 per cent. excess air capacity. The flywheel is 20 ft. diameter and weighs 50 tons. The entire engine complete weighs about 600 tons.

New Alliance Ladle Cranes.

Undoubtedly the most important cranes in steel works are those which handle ladles full of molten iron or steel. In open hearth plants there are always one or more ladle cranes covering the space adjacent to the pouring side of the furnaces; these cranes are used to receive the molten steel from the furnaces and pour it into the ingot molds. Further, in these plants which are run in conjunction with blast furnaces, there are one or more ladle cranes covering the space adjacent to the charging side of the furnace; these cranes are used to pour the molten iron from the blast furnaces or mixers into the open hearth furnaces. The larger plants also have one ladle crane over each metal mixer.

The size of ladles for receiving the molten steel has been steadily increasing; in fact, at the present time propositions are being considered in which the dimensions of these ladles are so large that they cannot be transported in one piece by the railroads. In one installation of three ladle cranes built by the Alliance Machine Company the cranes are regularly employed in handling ladles, which, with the molten steel contents, weigh 145 tons.

A new type of ladle crane has been brought out by the Alliance Machine Company, Alliance, Ohio, to dispense with certain objectionable features in existing ladle cranes. This new type of machine can be best described by comparison with those in previous use.

The ladle crane, commonly known as the overhung chain or rope type, consists of a crane bridge composed of two girders mounted on the usual end carriages. The trolley for carrying the ladle runs on rails on top of the girders; the sides of this trolley extend beyond the crane girders, hoisting drums are located on these extended sides, and hoisting ropes depend from these drums to the ladle bail. These hoisting ropes overhang the crane girders outside the base of support of the trolley. There is also an auxiliary trolley for tipping the ladle in either direction, this trolley runs underneath the main trolley and in between the crane girders on rails supported on the lower flange thereof. On account of the overhanging ropes from the main trolley the bridge motor is necessarily located as close to one end of the bridge as possible, and the operator's cage is attached to one girder usually directly under the bridge motor. These are the general features of the overhung type.

The disadvantages of this construction are as follows:

The chains or ropes from the main trolley overhang the crane bridge girders, and should one set of ropes, chains or gearing break it would throw the entire load on the crane on the other set of ropes at the opposite side of the crane bridge, and consequently, due to the leverage exerted and the momentum of the swinging and falling load, tends to overturn the main trolley and throw it entirely off the crane bridge; such accidents have occurred. The mounting of the auxiliary trolley on the lower inner flanges of the crane bridge girders creates a considerable twisting moment in these girders, and consequently there is quite a tendency to spread them apart and allow the auxiliary trolley to drop out. As the auxiliary trolley is located between the crane bridge girders it is practically inaccessible for inspection or repairs. If a piece of machinery is difficult of inspection or access the tendency is to make only a cursory inspection, hence in such cases replacement or adjustments are usually made only in case of an actual breakdown, and if a crane has a ladle full of hot metal hanging from it when a breakdown occurs the consequences are apt to be serious. Quick repairs, ease of adjustment and accessibility are the features of prime importance in cranes for steel works service. In order not to interfere with the overhanging ropes the bridge driving motor is mounted as close to one end of the bridge as possible; such a position of the driving motor has a tendency to make the bridge run out of square with the runways, due to the decidedly unequal lengths of the drive shaft from the motor to the track wheel gears at the ends of the crane. The main trolley cannot travel the full length of the bridge on account of the overhanging ropes interfering with the operator's cage and bridge

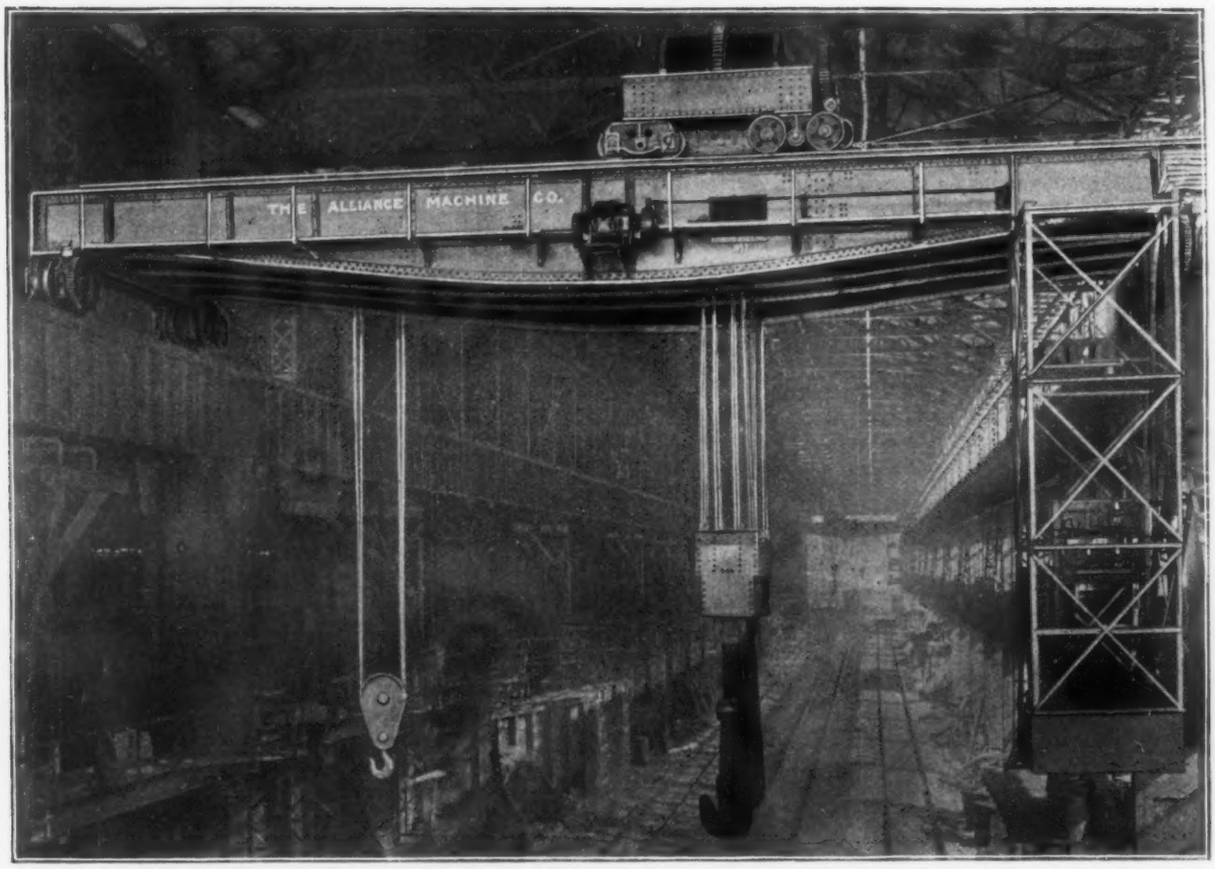


Fig. 1.—One of Six 125-Ton Alliance Four-Girder Ladle Cranes in the Open Hearth Department of the Indiana Steel Company, Gary, Ind.

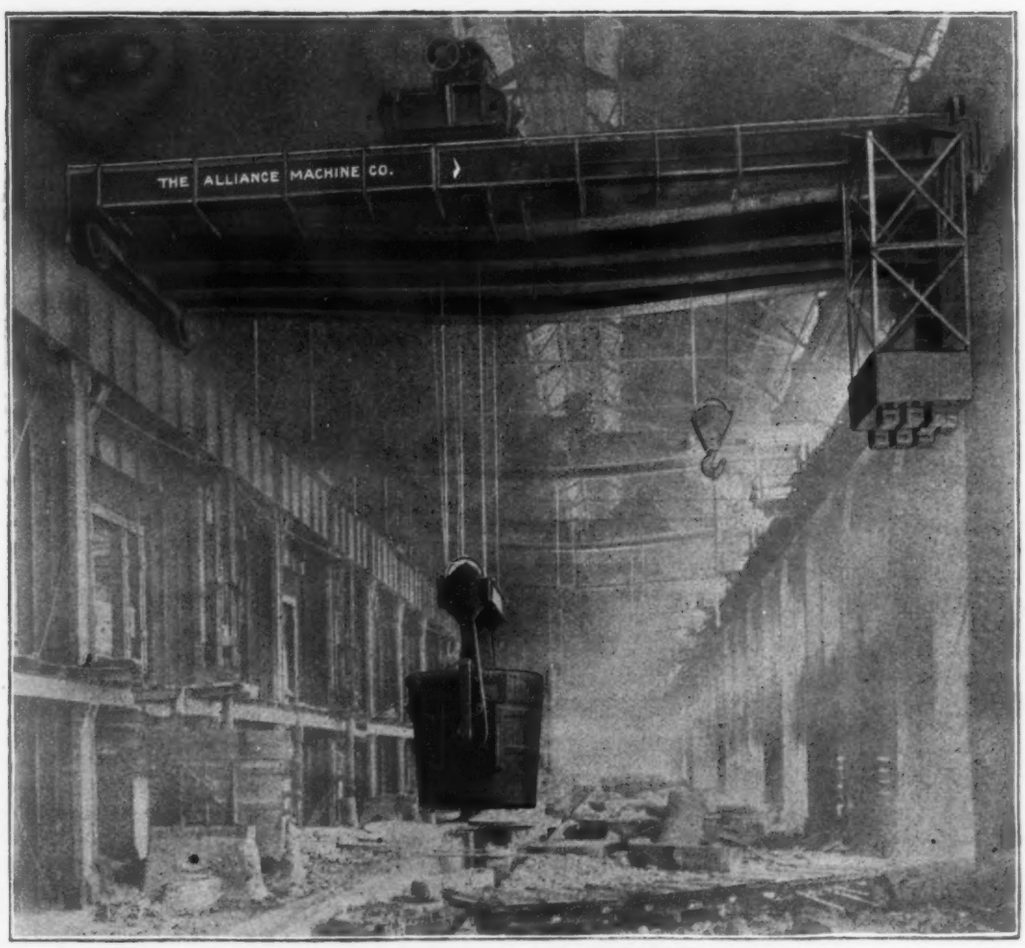


Fig. 2.—An 80-Ton Alliance Ladle Crane in the Worth Bros. Company's Works.

motor. The operator's cage must be located at one end of the bridge, and, while this is the usual location, yet there are cases, notably in ladle cranes over charging floors, where it is desirable to locate the operator's cage at some distance from the end of the crane. Various plans have been proposed, patented and used to reduce

the disadvantages referred to above, but none, it is stated, have entirely removed them.

The new Alliance crane designed to eliminate these disadvantages consists of a traveling bridge having two outer and deeper girders, which form the sides and fix the width of the bridge, and are secured to end carriages, the type of which depends upon the capacity of the crane, and also shallower inner girders located between and parallel with the outer or main girders, with a free space between each outer girder and its adjacent inner girder to enable travel of the main hoist ropes between them; main hoisting ropes located between the main outer or bridge defining girders and the inner or supplemental girders, while the hoisting ropes from the auxiliary trolley depend centrally between the inner girders; and an auxiliary trolley centrally mounted on rails on the tops of each auxiliary girder. The main trolley runs on rails centrally located on the two outer girders.

This construction is without the disadvantages of the previous overhanging type of crane for the following reasons: The hoist ropes which carry the ladle are inside the girders, and consequently do not overhang the base of support of the main trolley; hence the trolley cannot be overturned under any circumstances. The auxiliary trolley is mounted centrally on top of the inner girders; hence there can be no twisting or side strains in these girders. The auxiliary trolley is mounted on the tops of its supporting girders and is thus entirely accessible on all sides for inspection and possible repairs. It can be lifted off entirely, if so desired, without dismantling any part. As the bridge driving motor is located in its proper place, namely, at the center of the crane bridge, there is no tendency to make the bridge run out of square with the runways, as the strain on the bridge driving shaft is equalized. The main trolley can run the full length of the bridge, as there is nothing to prevent the free passage of the hoisting ropes from end to end of the crane, and the travel of the trolley is limited only by the size of the trolley itself. The cage can be located anywhere on the outer girders, as there are no overhanging ropes to interfere.

The illustrations herewith show some of the typical uses to which the cranes are put. In Fig. 1 appears one of the six 125-ton ladle cranes at the Indiana Steel Company's plant, Gary, Ind., where the molds are poured from the top while on the ingot carrying cars. This is the system usually adopted. Fig. 2 shows an 80-ton ladle crane in the open hearth department of Worth Brothers at Coatesville, Pa., where casting is done in pits and the bottom pouring system is used. Fig. 3 shows 80-ton ladle cranes at the Youngstown Sheet & Tube Company in its Bessemer department.

On account of the importance to steel works of these cranes and the danger incident to handling molten metal in such large quantities, these cranes are of all-steel construction, in which all parts subject to tensile strains are made of annealed open hearth steel castings or built up structural steel members.

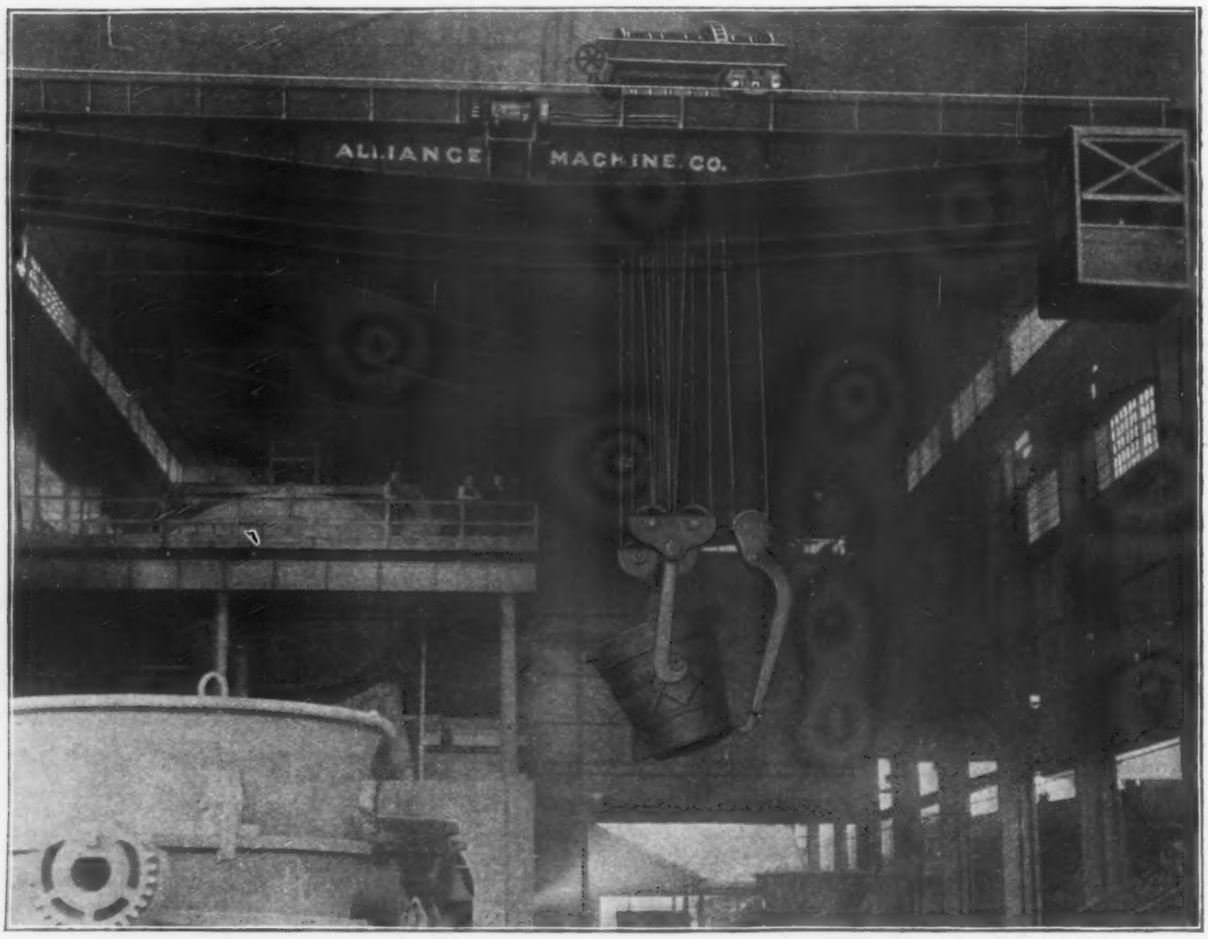


Fig. 3.—An 80-Ton Alliance Ladle Crane in the Youngstown Sheet & Tube Company's Bessemer Department.

The N. & G. Taylor Company, Philadelphia, announces that, commencing January 1, its interests in Baltimore will be looked after by John W. Scaffe, a resident of that city, formerly connected with E. L. Parker & Co. It is an interesting fact, not generally known, that the N. & G. Taylor Company not only operates the only open hearth furnace and black plate plant in Maryland, but is also the only manufacturer of high grade roofing tin and bright tin in that State. Although essentially a Philadelphia house, its position as one of Maryland's representative industries commends it favorably to the trade in that State and elsewhere south of Mason and Dixon's line.

Gulick, Henderson & Co., Pittsburgh, engineers, founders and chemists, have opened a Western office in the Manhattan Building, Chicago, in charge of W. O. Collins, who was formerly a member of the firm of Collins & Stevens, making a specialty of inspecting and general engineering work.

The Schultz Improved Friction Clutch.

What is known as their new improved friction clutch has lately been put on the market by A. L. Schultz & Son, Chicago, Ill. The clutch is made in sizes from 6 in. up to 72 in., transmitting from 3 to 500 hp. per 100 revolutions. The new clutch may be used as a clutch coupling, connecting two shafts of the same or different diameters, so that should the machinery on one line of shafting be out of use it would not be necessary to have that shaft revolving, causing wear and tear and expense of power not used. The idle shaft can be put into use instantly by merely pulling a lever. The clutch may also be attached to pulleys, sheaves, gears or sprockets, in which case the clutch is keyed to the driving shaft, the pulley, sprocket or gear being placed on the driven shaft.

Fig. 1 shows a 14-in. clutch transmitting 30 hp. per 100 revolutions connecting two shafts of different sizes. This size clutch can be bored to take shafting up to a diameter of 4 15-16 in. The various parts of the clutch are shown in Fig. 2 and Fig. 3 gives the general construction. It will be noticed that there are very few parts, and none of them of great intricacy, so that a workman of average skill can take the clutch to pieces and put it together again. The friction is furnished by two sets of wood blocks, forming a continuous circle on each side of the friction plate. On the front side of the friction plate the friction blocks are V-shaped, thereby giving greater friction surface by at least one-third more

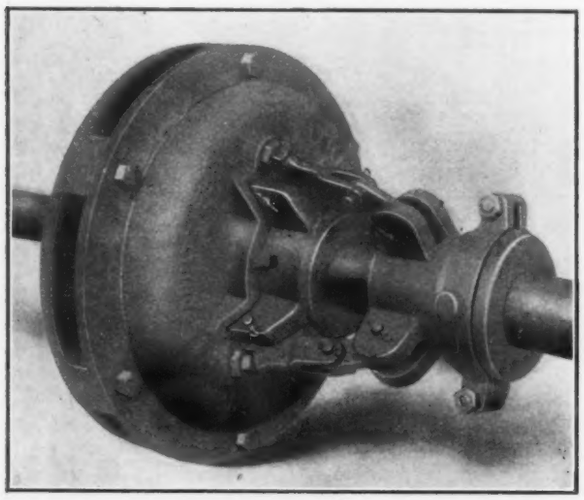


Fig. 1.—A 14-In. New Improved Friction Clutch Made by A. L. Schultz & Son, Chicago, Ill.

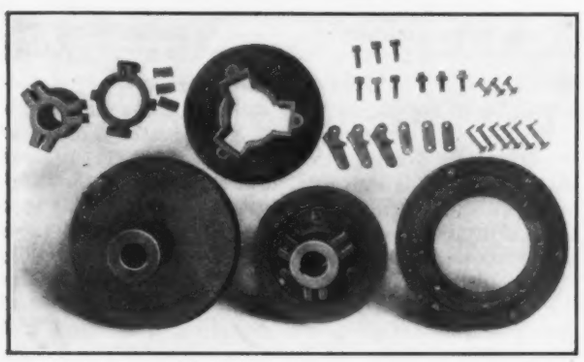


Fig. 2.—Unassembled Parts of the Clutch.

than the usual construction. At the same time this V-shaped arrangement will line up the shafting, should the shafting be a trifle out of line and inclined to wobble on the ends where they come together. The ordinary clutch coupling the ends of two shafts does not bring them into line, and the power transmitted while they are out of line, even if they are out only a trifle, will tend to cause the ends of the shafting in revolving to form an eccentric, likely in time to injure the clutch, necessitating repairs and loss of time. This new clutch being a self-centering clutch, therefore, overcomes, it is claimed, one of the worst troubles with which users of clutches have had to contend. The clutch is made either solid or split.

When it becomes necessary to renew the wood friction blocks it is not necessary to remove the clutch from the shafting. Merely releasing the cap screws will enable the operator to push the entire front of the clutch far enough away to conveniently get at the friction plate. Replacing the wornout friction blocks with new ones requires a few minutes only, and can be done by any one.

The toggles which attach to the sliding collar are made of wrought iron, while those nearest the body of

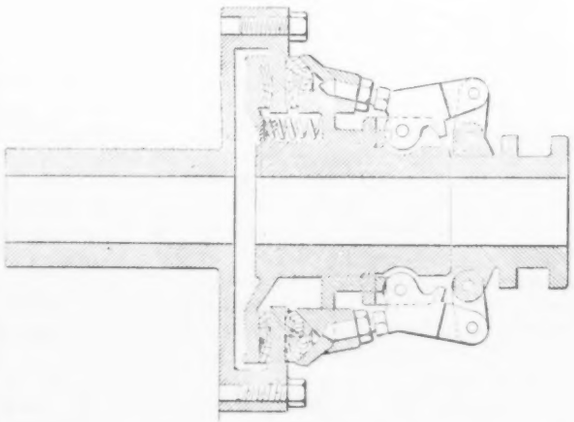


Fig. 3.—Construction Details of the Clutch.

the clutch are made of cast steel. The clutch is thrown in and disengaged with a positive movement and is strongly locked in either position. It is impossible for it to disengage itself by centrifugal force as is the trouble with many clutches. The adjustment is very simple, and the clutch occupies relatively little space on the shafting. The 14-in. clutch illustrated occupies 12 in. on the shaft, from the back of the clutch to the end of the sliding collar.

Bonuses for Australian Iron and Steel.

Recent advices from Australia indicated little doubt about the passage of the iron bonus bill, effective January 1, 1909. Differing from the bill originally put forward, it provides that on products in class 1, *viz.*, pig iron, made from Australian ore; puddled bar iron, made from Australian pig iron, and steel made from Australian pig iron, the bounty shall be at the rate of 12s. per ton, up to a total of £150,000, payable up to the end of June, 1914; and that on products in class 2, *viz.*, galvanized iron, made from Australian ore; wire netting and wire, made from Australian ore, or from wire manufactured in the United Kingdom; and iron and steel tubes or pipes (except riveted or cast), of not more than 4 in. internal diameter, it shall be at the rate of 10 per cent. ad valorem, up to a total of £30,000, payable to the end of June, 1912.

While the new bill may increase iron and steel production in Australia somewhat, the London *Iron and Coal Trades Review* does not look for any important increase in British exports for some time, in any event. Concerning the unsuccessful operation thus far of the Lithgow Iron Works it says: Figures have been supplied showing that with no protection and no bonus, it cost roughly £3 10s. to produce a ton of pig iron at Lithgow Iron Works, New South Wales, while the iron was sold at £3 1s. It also cost £10 12s. to produce a ton of bar iron or steel, whereas the average selling price was £10 10s. The vicissitudes of fortune which have marked the private enterprise at Lithgow, notwithstanding the support afforded it by the government of the state and the ample available supplies of ore, coal and limestone, led to the demand on the part of the Socialists that the government itself should take over the works and engage in the iron and steel industry; but this proposal has been defeated in the Senate, ministers pinning their faith, apparently, to the bonus scheme.

OXY-ACETYLENE WELDING AND CUTTING.

BY H. R. COBLEIGH.

There are still those connected with metal working industries who are not familiar with the welding and cutting of metals with the oxy-acetylene blowpipe. Many think of them more as interesting laboratory or lecture demonstrations than truly commercial processes. Still more have not seen the apparatus used, and it is due to this fact that the erroneous impression of its practical worth has been created, for to witness it carries conviction that a new and highly important art has been found.* Being still in its infancy, the extent of its possibilities are yet to be determined and new uses are continually being found. Accustomed as we are to the idea that the working of metals is confined to changing their form by bending or forging, drawing, or tooling by hand or machine—all processes which reduce the section or barely maintain it (except the upsetting of wrought metals)—it is difficult to adjust ourselves to the thought that now metals can be added to or built up with this torch, which has appropriately been called a "putting-on tool." The nearest approach heretofore to such work is the common form of welding, which appears exceedingly limited by comparison with the new process.

A significant name for the process is lacking. Autogenous welding does not cover it, for that means self-welding or welding with the same metal, whereas, if such a thing should be desirable, two different metals can be united by one of their kind or a third metal, and the result would not be comparable with either brazing or soldering, as there is more intimate molecular union. Welding is not the best word either, for that commonly implies the employment of force, as compression or hammering. It is more strictly casting, since the union is made by the flowing together of the metals as in a mold; but that word is even more misleading on account of its commonly accepted meaning. Fusion welding perhaps best expresses it and would be an excellent term, but unfortunately it has been adopted by another new process of uniting metals which is entirely different and more analogous to brazing.

As is natural with every new thing, the oxy-acetylene

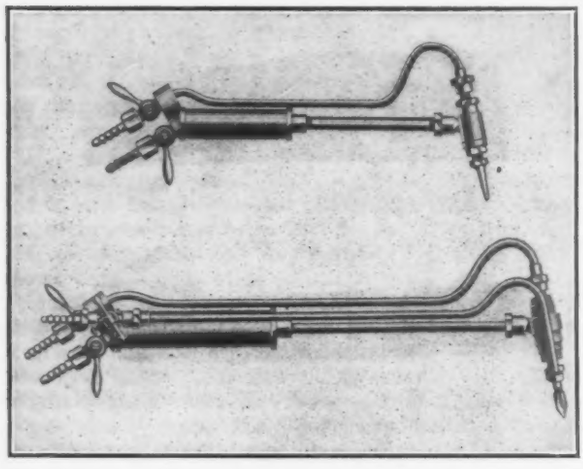


Fig. 1.—The Davis-Bournonville Small Welding Torch and Large Welding Torch with Cutting Attachment.

torch was at first overestimated by those identified with its introduction, and the enthusiastic accounts of it given out at that time were inclined to credit it with being suitable to too great a field. Its limitations were not recognized. Without doubt this retarded its advance. It was not recognized that skill and experience play the part that they do, that the apparatus had not been perfected to the point of being adaptable for every purpose, and that some work by its very nature does not lend itself to this treatment and can be better handled by older methods or others yet to come. For a time even the developers of the process were discouraged, and there was a reaction quite as unwarranted as the first too optimistic belief in it. Further investigations leading to improvements here and there in apparatus and methods of handling have brought a return of confidence and a determination to take each step forward with great care to be sure of the ground. To every inquiry from an untried field the answer now is not based on guesswork, but a test is made before a positive answer is given. To the proved successes this article aims to confine itself—to be an impartial statement of facts recognizing the present limitations and so far as possible truthfully reporting the situation now and conservatively estimating the future.

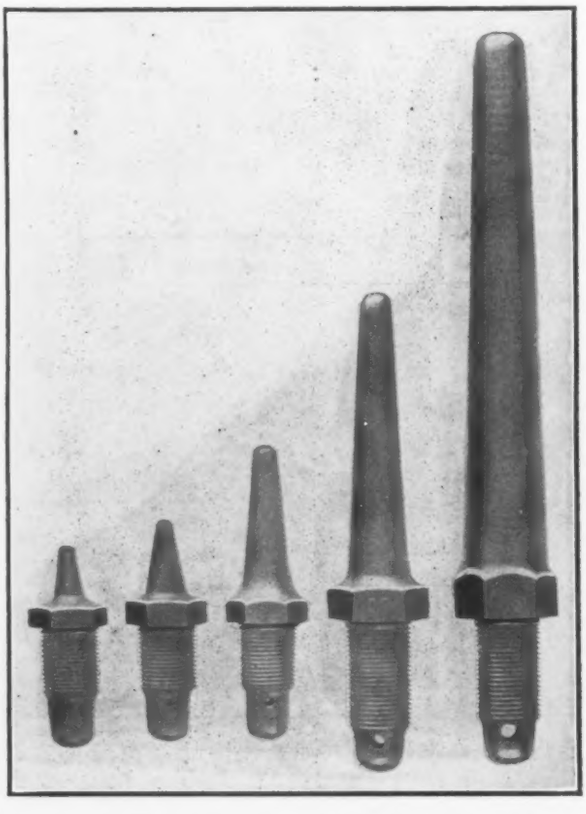


Fig. 2.—Five of the Thirteen Sizes of Nozzles or Tips.

Unfortunately for the rapid extension of the use of oxy-acetylene welding, the impression has been given that the process is simpler than it really is and that anybody can weld with it. The truth of the matter is that some skill is required, and until this is accepted there will continue to be failures. A man is not expected to be able to temper tools without some training, and it is the same with autogenous welding. Those best informed and most experienced in the art are still learning, and those taking it up for the first time cannot do better than profit by the knowledge already gained. A manufacturer undertaking to do his own work must expect to have one at least of his workmen educated by the manufacturers of the apparatus used.

The oxy-hydrogen, the hottest flame blowpipe before the oxy-acetylene was developed, gives a temperature of only about 4000 degrees F. Acetylene produces about five times as much heat per cubic foot and is much more intense, its temperature being about 6300 degrees F.

The Torch.

The torch is the thing of all others upon which success finally depends. Three kinds of torches are at present

* Concerning the history of the development of this process the reader is referred to a paper presented by Eugene Bournonville before the Technology Club of Syracuse, printed in *The Iron Age*, November 26, 1908.

in use, known as high pressure and low pressure torches, according to the condition under which the acetylene is supplied. In the low pressure torch it is under practically no pressure, but is drawn in by the injector action of a jet of oxygen under pressure.

On the question of pressure there is considerable difference of opinion. It appears to be true that high pressure is ideal as far as thorough mixture of the gases in the nozzle is concerned, but such a torch is hard to use because it tends to blow the metal away as fast as it melts. With a low pressure torch, on the other hand, it is extremely difficult to get a proper mixture, as the acetylene injected will vary in amount as the square of the velocity of the oxygen, which in turn varies with any change in size of the opening at the end of the torch by expansion and contraction or the adherence of particles of metal to the end if it accidently comes in contact with the metal welded. If the opening becomes materially reduced, oxygen alone will come through, as the acetylene is not under pressure. With care, however, this torch gives excellent results.

The high pressure torch can be used only with acetylene under a high pressure, and as acetylene cannot be compressed safely above 30 lb. it requires using dissolved acetylene. While this torch gives an accurately

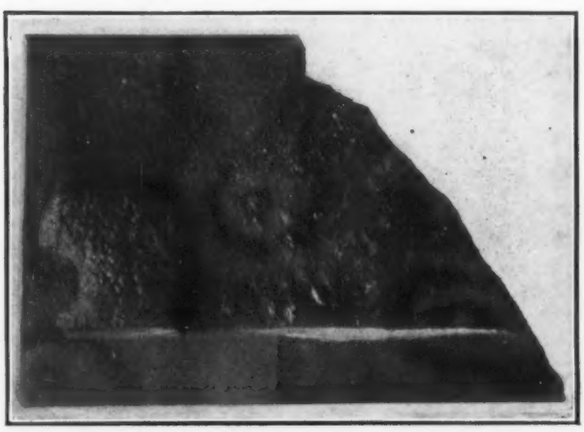


Fig. 3.—A Demonstration Piece of Welding.—The Triangular Piece Is Cast Iron; the Rectangular Piece Steel, and the Excrescence on It Copper.

controllable flame, it is hard to prevent flash backs, in present forms of construction. Low pressure torches have the advantage that they can draw their acetylene directly from a lighting generator, which gave them the preference in the beginning. Medium pressure torches are superior to low pressure, as a proper flame can be easily obtained and positive control of the gases is demanded. Too much oxygen oxidizes, too much acetylene carbonizes the metal, and both produce defective work. The ratio of oxygen to acetylene theoretically required for complete combustion is 2.5 to 1, but in actual practice low pressure torches are found to require 1.8 to 1 and medium pressure torches only 1.28 to 1 for a neutral flame. This is doubtless due to the more intimate mixture of the gases in the medium pressure torch and indicates a greater economy, inasmuch as less oxygen is required, and this is the more expensive of the two gases in the ratio of 3 to 1.

The medium pressure torch is commonly known in this country as the high pressure torch, because the one of still higher pressure was never introduced here. It does not require dissolved acetylene. The flame is easily controllable and the outlets of each gas being at the inner end of the nozzle, do not vary. Any variation in the final outlet of the mixture will affect only the size of the flame and not the proportion of the two gases, hence a neutral flame which will neither oxidize nor carbonize is easily maintained once the controlling valves are properly set for the relative supply of the two gases, and this is easily determined by the appearance of the flame. With excess of acetylene there are two cones in the flame, and with excess of oxygen the flame assumes a violet tint. It is usual to first turn on the acetylene and then add oxygen until the two cones coincide, when a neutral flame is obtained. By adjusting both gases the size of the flame may be varied to suit the work, so that each different size of nozzle has a considerable range. The proper flame is also indicated by the condition of the weld. If the metal glows intensely the flame is carbonizing, and if it boils up too much oxygen is being used.

The medium pressure torch made by the Davis-Bournonville Company, New York, is the American form of that made by A. Boas, Rodrigues & Cô. in France. Fig. 1 shows the two sizes of this torch. Largely the superior economy claimed for it is due to the use of a smaller flame for a given work than most torches use. Thirteen sizes of nozzles are furnished, five of which are shown in Fig. 2. The first one at the left is the very smallest made, known as No. 0. Next to it is the No. 1, which is the minimum size used in common practice. The third, a No. 4, is the size perhaps most used of all. No. 8, the fourth, is the largest size which it is usually found necessary to use, and the one at the extreme right is a No. 12, an extra large one, for only the heaviest kind of work. The smaller torch takes all of the nozzles up to and including the No. 5, and the larger size takes all of the nozzles from No. 4 to 12, inclusive.

There is also shown in the view of the larger torch the addition of the attachment used in cutting metals with the blowpipe, this being an extra tube for the passage of a jet of oxygen under 125 to 225 lb. pressure. In the use of the torch for cutting, the acetylene and low pressure oxygen are first employed until the metal is almost at welding heat, then the jet of high pressure oxygen is turned on and the metal burns directly by union with the oxygen in what is substantially a very high rate of oxidation. Passing the torch along the part to be cut the acetylene and oxygen jet preheats the metal, so that as it is followed by the high pressure jet of oxygen it is in condition to be immediately consumed or melted. The process of cutting is neither completely one of consumption nor of melting. Part of the metal is burned and part melts and falls through the cut. A cut can be much more rapidly made by making allowance for this condition, leaving it possible for the melted metal to fall away and not freeze in the cut. It is the practice of some in cutting to begin at the lower edge of the metal, so that the hot metal can fall out. Usually, however, it is just as satisfactory to begin at the top rear edge, inclining the flame and the jet of oxygen downward so that the metal falls through about as sawdust would from a saw kerf.

With the cutting tube removed, the larger torch would appear the same as the smaller one in Fig. 1, the upper pipe of which carries the oxygen at 8 to 30 lb. pressure, according to the thickness of the metals to be welded and therefore the size of the nozzle used, and the lower pipe the acetylene at about 1 lb. pressure. The oxygen enters the tip directly in the line of flow, the acetylene enters laterally through four holes, both uniting and discharging through one hole. The openings are accurately sized to secure proper mixture at a definite relation between the pressures of the two gases, which is the secret of the success of the torch. The flow of gases is also controlled by the operator through regulating valves on the torch to give the proper proportion of the two gases and the required size of flame. With the tip or nozzle in place a flash back cannot extend beyond that point, but the enlarged part of the torch forming the handle is a reservoir packed with porous material, which is an additional security against flash back.

The Supply of the Gases.

One of the greatest hindrances to the adoption of the process is the difficulty in obtaining a commercial supply of oxygen at reasonable expense. Volume for volume, it at present costs three times as much as the acetylene. Several companies are now supplying oxygen, but they are mainly in the East and a well distributed supply has yet to be developed. When users desire to manufacture their own oxygen the company furnishes a plant which employs the chlorate of potash process and has a daily

capacity of 1000 to 1500 cu. ft. A special two-stage compressor, with copper intercooler and both cylinders submerged in water, is included in the equipment.

Acetylene may be used in two forms, as dissolved acetylene in tanks containing acetone, which will absorb about 25 times its volume of acetylene for each atmosphere of pressure or the gas may be supplied from an acetylene generator. Generated acetylene costs only about one-half as much as dissolved acetylene. The latter, however, is very convenient in outside repair work, where portability is a feature.

The Davis pressure generator, developed from the generator used in the lighting industry for some years and made by the Davis Acetylene Company, has passed the underwriters' requirements. With it the torch can be supplied directly at the pressure required through a pressure regulator. This generator uses lump carbide, which yields from 5 to 15 per cent. more gas than the finely crushed carbide. The carbide is dropped into water from a hopper by a feeding mechanism automatically controlled by the pressure of the generated gas. The principal difference between this machine and the Davis acetylene lighting generator is that the feeding mechanism is controlled by a pressure diaphragm instead of the movements of the gas holder bell. The pressure can be changed by moving a weight on the controlling lever of the diaphragm.

Acetylene contains approximately 92.3 per cent. carbon, the remainder being mainly hydrogen. This hydrogen is an advantage in a way. It will not unite with oxygen above the temperature at which water dissociates, which is lower than that of the oxy-acetylene flame. The hydrogen is therefore not consumed until it unites with the oxygen in the air, when it burns as a semiluminous flame surrounding the welding flame and protects the latter from being cooled by the inert nitrogen, forming about 80 per cent. of the contents of the air. The enveloping flame also contains carbon monoxide, burning by contact with the oxygen in the air to carbon dioxide. The presence of the hydrogen and carbon monoxide also protects the metal being melted from oxidation.

Use of the Torch.

The process of welding as carried out with the blow torch is very different from the ordinary process of welding. The junctions of the metals to be united are neither lap nor butt joints, as in the ordinary welding, but are chamfered off if not already of a form which permits the penetration of the flame to the remotest parts of the surfaces to be welded toegther. There is then added to the joint, after it is itself in a running condition, drop by drop, molten metal from a rod or special wire used the same as a stick of solder.

It is usual in welding two like metals to use a solder stick of the same material. When metals of different kinds are being united, the stick should be of approximately the same material as the one of the two to be joined which melts at the lowest point. Some will say that either one of the two metals may be used, or even a third metal, but it has been found, for example, that it is almost impossible to join cast iron to steel or wrought iron with the use of a steel or wrought iron solder stick. The weld at best is imperfect, whereas with a cast iron solder stick a very thorough and satisfactory weld can be made, as is shown in Fig. 3. The reason is that molten cast iron dropped on steel previously brought to welding heat will not chill before a union is formed. When steel is dropped on cast iron, unless the cast iron is so highly heated that it is in danger of being burned, it chills the molten steel dropped upon it, the melting point of cast iron being lower than that of steel.

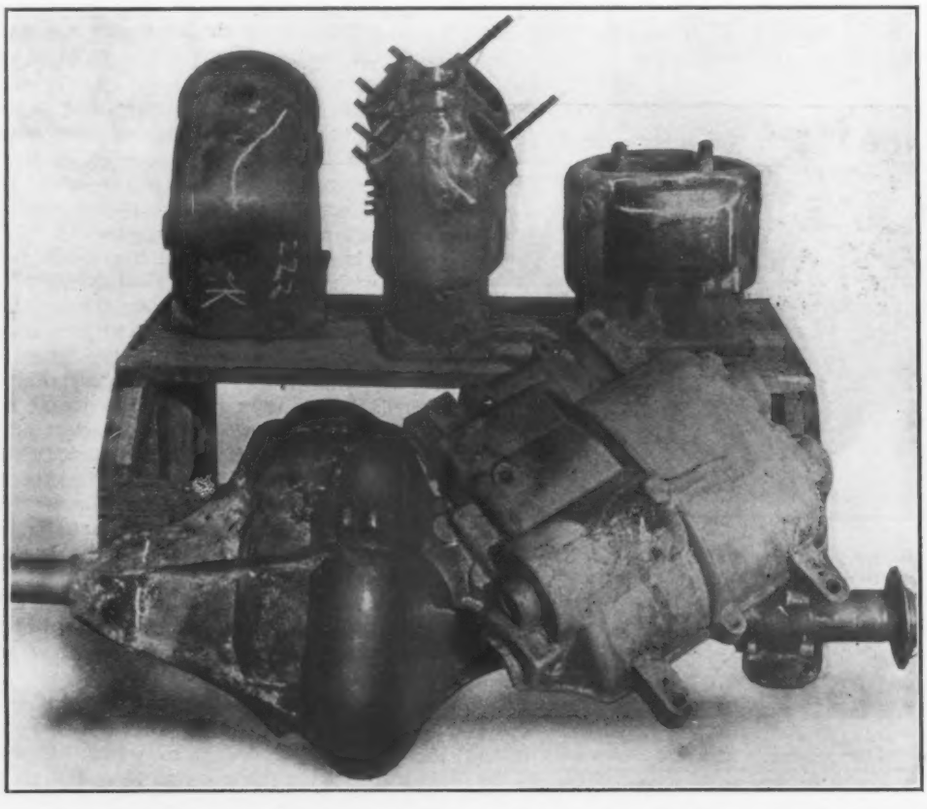


Fig. 4.—A Group of Repaired Castings.—Chalk Marks Showing Where They Were Cracked or Broken. The Cylinders and Differential Case Are Cast Iron and the Crank Case Aluminum.

The welded specimen in Fig. 3 also shows copper built on, and the ground part shows how perfect is the weld between the copper and the steel and the steel and cast iron. Were it not for the difference of the color of the metals the joint could not be discerned.

For welding iron castings the solder stick employed is a cast iron rod, free from sand and so far as possible all other impurities. For steel a special wire is used. The degree of hardness of the material used as the solder stick is immaterial, as the metal is annealed in the welding if allowed to cool in the air. For cast iron welding and the welding of certain other metals it is advisable to use a soldering or scaling powder. This is not, however, to be construed as a flux. No flux is required or used. The effect of dropping the scaling powder upon the metal is to make it more fluid, so that the parts will run together and unite in a homogenous mass.

Even though the temperature of the flame is very high there is no danger of burning the metal welded except

by carelessness, as the heat is rapidly dissipated by radiation. It is this fact that makes autogenous welding with any other combination of gases difficult, if not impossible, as the heat is radiated too fast to allow sufficient local heating to produce fusion. Metals of different conductivity, as well as different melting points, therefore require flames of different sizes.

Some operators use goggles and gloves, which should be wholly unnecessary for most work. The common mistake is to use a flame larger than is needed. Equally good and better work can be done with a small flame, and very much more economically.

The welding of aluminum is something of an art in itself. This metal behaves not at all like any other upon which the torch is commonly employed. When heat is applied it first assumes a pasty condition and never becomes really fluid until almost at the burning point. If it is attempted to make a weld in aluminum by heating to the fluid temperature, oxidation ensues and a perfect weld is impossible. If, on the other hand, the heat is applied only until the metal and stick are in a pasty condition, they may be then worked or rubbed into intimate contact with an iron spatula and a weld formed of a strength equal to that of the metal in any other section.

There appears to be no limit to the thickness of metal which can be welded if the weld is performed on the edges turned over as flanges back to back. Metal sheets can be butt welded of as thin a gauge as No. 20. The welding of seams in sheet iron articles is very satisfactorily accomplished when a very small flange is turned up so that the heat can be played on the edges of the adjoining parts of the seam. In this way stamped or spun metal parts, such as cooking utensils, can be formed into very intricate shapes. The process is extensively employed by manufacturers of enameled ware. It has the advantage of giving a joint that cannot be injured during the baking of the enamel. When solder is used there is often much trouble from its being melted in the enameling oven and the seams opening up.

Similarly there is no limit to the thickness of metals which can be welded. Cast iron 14 in. thick has been welded. Metal up to ⅛ in. can be welded without chamfering the edges, as the heat will penetrate sufficiently to weld clear through. Thicker metals should be chamfered to make a trough between the parts to be joined. Preferably the angle of the chamfer should be 45 degrees, or the angle between the two edges should be 90 degrees. It has been found to be a safe rule to always heat the metal to fluidity to a distance on each side of the center line of the joint equal to the thickness of the metal being welded. Much more extended or restricted heating produces a poor weld. In the first case, because the metal at the center becomes so hot that it burns, since there is no chance for radiation from the center through the highly heated adjoining metal. Heating too locally gives too much radiation and similarly results in a poor weld. It is best to keep the torch moving in a circle while heating material, so as not to overheat the treated spot. The heat spreading from the path of the point of the flame naturally focuses at the center of the circle, so that that part becomes heated quickly to the desired point and can be nicely controlled.

Typical Work.

Fig. 4 shows a number of castings which had been welded in the temporary repairing and demonstrating plant maintained by the Davis-Bournonville Company in Marion (Jersey City), N. J. At the top are shown three castings of gasoline engine cylinders which have been repaired in the places indicated by chalk marks on the surface of the castings. Beneath the cylinders are two other castings, one a rear axle, the differential case of which was cracked as shown at the left, and the other the crank case of an automobile engine. The latter is aluminum; all the other castings are iron.

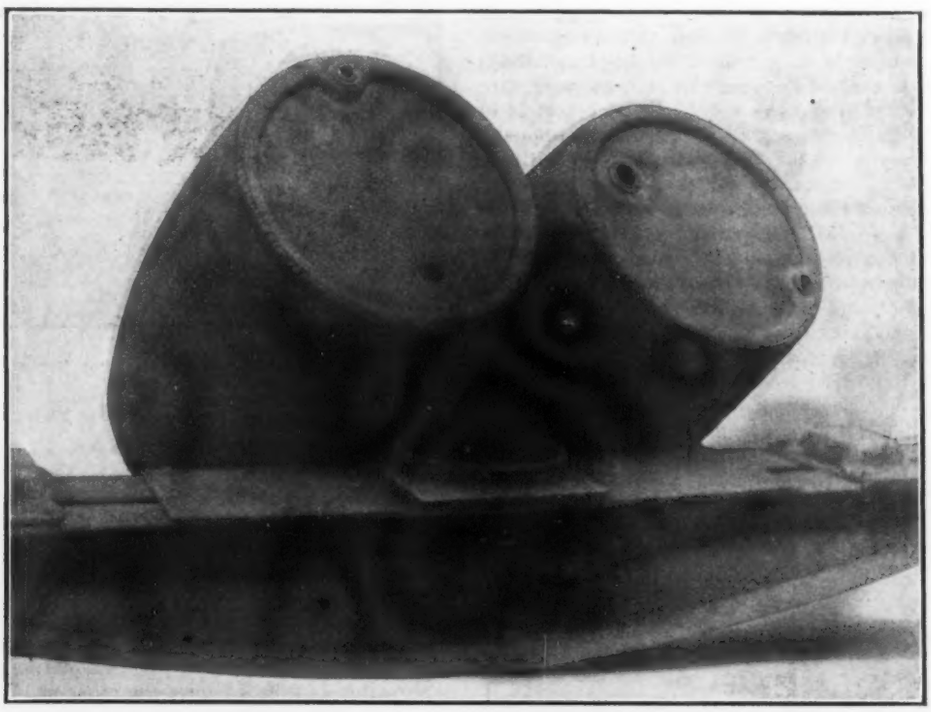


Fig. 5.—Steel Barrels With and Without the Heads Welded and a Cracked Truck Bolster to Be Repaired.

In Fig. 5 are two pressed steel barrels, in one of which, the one at the left, the head has been welded with the oxy-acetylene torch. The other barrel shows the head previous to the welding. The barrels are seen resting upon a truck bolster, which is cracked along the black line and will be repaired by the oxy-acetylene torch.

To repair a crank which had developed a flaw or crack in the angle between the side of the crank and the crank pin, it was first necessary to chip out the metal, being sure that the bottom of the crack was reached and removed. This was ascertained by watching the chip as it turned up from the nose of the chisel; while it separated into two parts it showed that the crack had not been entirely eliminated. When finally the chip came out in one piece it was known that the bottom of the crack was reached. It remained then simply to enlarge the opening so that a suitable trough was left for the building up of the new material. Fig. 6 shows the appearance of the crank when prepared for the welding. It was then preheated in a forge in the neighborhood of the part to be welded and built up, using a soft steel solder stick until the repair had the appearance indicated in Fig. 7. All that then

remained before the crank could be returned to service was the machining out of the excess metal in a lathe.

Precautions Necessary.

Failures in most cases to secure a satisfactory weld of a casting are due to leaving out of account the very important considerations of expansion and contraction. In the welding of a cylinder, for example, the whole cylinder should be preheated, this not only on account of expansion and contraction, but to economize in the time that the torch would be used to bring the joint to welding temperature by lessening radiation, and at the time the weld is made the metal should be heated a fair distance from the fracture. As the metal cools after the weld has been formed, the strains which would be induced by local contraction are dissipated sufficiently to avoid the formation of a new crack. It is serious, however, to heat to too great a temperature for much of a distance from the repair on account of the danger of distortion, and for this reason the high local heat possible with the oxy-acetylene torch renders it superior to other torches in performing autogenous welding.

In welding a casting of the shape of a bowl or basin it is very important to begin welding at the end of the crack which is nearest the center of the bowl and finish at that which is nearest the rim. In fact, the only sure way of succeeding in welding a crack of this sort is to continue the crack by forming a cut clear through the rim before beginning the weld. If now the weld is built up from the center to the rim the contraction which follows with the cooling will not produce a new break. On the other hand, if the weld is started at the rim, at the instant that the last opening in the crack is closed near the center of the bowl the vessel will crack again with a report like a pistol and the work have to be done all over This has been the experience wherever such a repair has been attempted. It is necessary in the repair of castings particularly to take into account the contraction and expansion of the material, but if these are properly allowed for a perfect weld can always be made. The secret of success in the use of the torch is appreciation of the effect of expansion and contraction and allowance for the flow of heat—*i. e.*, conduction.

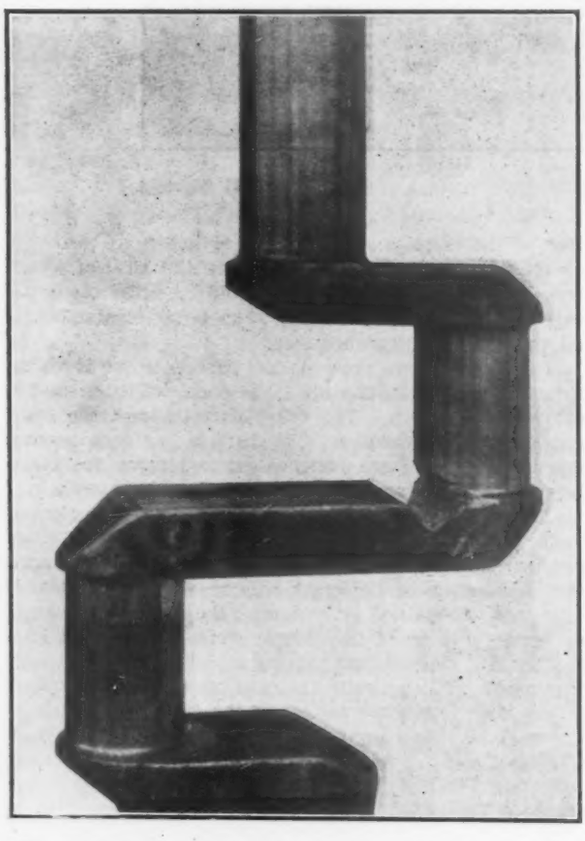


Fig. 6.—A Cracked Crank with the Fault Chipped Out Ready for Welding.

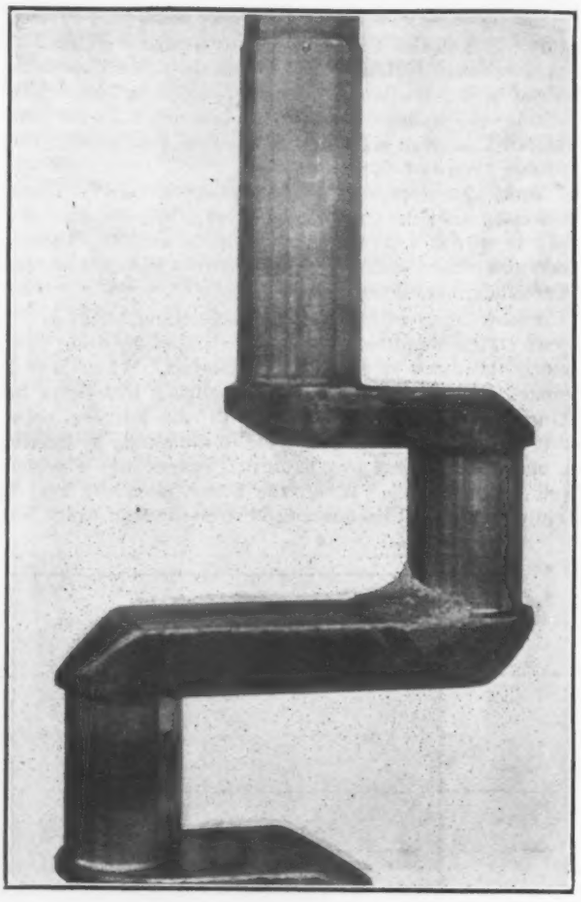


Fig. 7.—The Same Crank After Being Welded.

Difficult or Impossible Things.

Among the things which are difficult or even impossible to accomplish with oxy-acetylene welding is the uniting of two metals which have previously been brazed. The union will not be satisfactory unless all of the brass has been removed. This leads to another of the limitations of the process. It has been stated that autogenous welding can be performed with any metals, but it should be added, not with equal facility. While copper can be readily welded, a bronze, brass or any metal containing zinc cannot be easily, due to the volatile nature of the zinc which vaporizes before the other metals in the alloy are at welding temperature, and results in the formation of blowholes in the joints. By using borax or boracic acid moistened with water the volatilized zinc can be prevented from being deposited on the joint and destroying the weld. Because of the presence of zinc, galvanized iron also does not weld satisfactorily. Aluminum cannot be successfully welded to any other metal.

Cast iron cannot be satisfactorily cut with the tarch, but steel and wrought iron can be, and much faster than by any machine. In contractors' work the cutting of piling with the torch has been done very satisfactorily, and the cutting of beams for structural work in the shop or in the field. In cutting, the burning of the steel materially raises the temperature and assists in the work. In fact, the oxy-acetylene flame may be discontinued and the work carried on with the high pressure oxygen jet alone for a limited period.

Applications of the Process.

These appear to be almost without number; continually new uses are being found for it. The repairing of cracks and broken castings is but one of its many uses, although one of its most important. An exceedingly valuable field seems to be open for it in the correcting of imperfect castings, those having blowholes, cold shuts, &c. There is a much greater loss in steel than iron castings in the making, and the possibility of saving these with the blowpipe commends it especially to the steel casting foundry. Repairs of boilers and steam piping in place, saving loss of time in suspending operations, are other important uses. Welding flanges on pipes is a large field in

itself. Piping manifolds or connections of intricate form can be made. Containers for gases and liquids can be welded and made seamless, and when roughly handled and even dented will not leak like riveted vessels. Castings impossible or difficult to mold can be made in parts and united into single pieces. All joints which never need to be broken can be welded instead of bolted, and compactness, lightness and greater strength secured. Cast iron heads can be connected to valve stems, putting in each place the metal best suited to that part. Castings which by reason of distance from the factory cannot be duplicated quickly can be repaired with a minimum loss of service from them. In nearly all repairs an excess of metal can be added to the joint to make it stronger than before, so that it will not break again in the same place. By restoring a broken casting there is saved not only the cost of the casting, but frequently the expense of drilling or machining it to fit where it belongs. A great advantage of the process is that very many jobs can be done in position—that is, without removing the broken parts.

Another use which has suggested itself is the joining of the reinforcing of concrete. The parts can be quickly stuck together, and the absolute freedom from movement, that can hardly be insured by using tie wires or bindings, means less chance of the concrete cracking and much more efficient reinforcing. To the street railroads the means of bonding rails with copper bonds with a permanent joint means a very great deal. The automobile industry has already found considerable value to itself in the process. Worm parts of machinery and teeth on gear wheels can be built up, tool steel added to common steel, dies repaired, and so on almost without limit. It is probable that the manufacturers of the apparatus as yet do not begin to appreciate the possibilities of the art.

In repair work it is not always a matter of putting back a broken piece or closing a crack. If a small piece is missing new metal may be added on to take its place. Sometimes it is easier to build new parts than to use the old ones. Again, if it is desired to modify the shape or change the position of bolt holes new pieces can be added, such as lugs, bosses, &c. Old bolt holes can be closed and new ones drilled. A worn hole can thus be restored to its former size instead of drilling it out larger. It is also possible to assemble in one piece those of different metals, thus castings can be joined to forgings. Wearing qualities may require steel in certain places, while wrought or cast iron will afford the requisite strength for the bulk of the supporting body. With the oxy-acetylene torch it becomes as easy a matter to extend a piece as to shorten it. Just now there is a certain automobile manufacturer who has been helped out of a dilemma. He had in stock some thousands of forged parts for the transmission that proved about 1 in. too short. Instead of scrapping the stock, it was saved at comparatively small cost by building out the ends to the necessary length.

In wrecking bridges, boilers and other metal structures the cutting torch has been very extensively employed abroad, where the introduction of the process has advanced more than in this country, but numerous demonstrations have been made here which will mean its more frequent use as its value becomes known. Similarly in rolling mills, steel foundries, boiler works, machine shops, &c., both the cutting and welding torches are becoming standard parts of the equipment.

The cost of welding and cutting, based on oxygen at 3 cents a foot, acetylene at 1 cent a foot and labor at 30 cents an hour, is given in the following table as taken from the catalogue of the Davis-Bournonville Company:

Approximate Cost of Oxy-Acetylene Welding.

Tip No.	Thickness of metal, in.	Consumption per hr. Acetylene, cu. ft.	Consumption per hr. Oxygen, cu. ft.	Proper pressure in lb., oxygen.	Lin. ft. welded. per hr.	Cost. Total, per hr.	Cost. lin. ft. cents.
1	1/32 to 1/16	2.8	3.6	8 to 10	50	$0.436	0.87
2	1/16 to 3/32	4.5	5.7	10 to 12	30	0.516	1.72
3	3/32 to 1/8	7.5	9.7	12 to 14	25	0.666	2.66
4	1/8 to 1/4	11.7	15.0	14 to 18	16	0.867	5.4
5	1/4 to 5/16	18.0	23.0	18 to 22	10	1.17	11.7
6	5/16 to 7/16	25.0	32.0	20 to 25	7	1.51	21.6
7	7/16 to 1/2	32.5	41.5	22 to 27	5	1.87	37.4
8	1/2 upward.	48.5	62.0	24 to 30	..	2.64	...

Approximate Cost of Cutting Steel.

Cutting tip, No.	1	2	3
Welding tip, No.	4	4	5
Thickness of steel, inches	Up to 1/2	1/2 to 1 1/2	1 1/2 up.
Heating jet, feet of acetylene.	12	12	18
Heating jet, feet of oxygen..	15 1/2	15 1/2	23
Cutting jet, feet of oxygen...	60	75	95
Pressure of oxygen heating jet, pounds	14 to 18	14 to 18	18 to 22
Pressure of oxygen cutting jet, pounds	125	125 to 150	150 to 175
Lineal feet cut per hour	50	40	30
Total cost per hour	$2.68	$3.13	$4.02
Cost per lineal foot, cents....	5.36	7.83	13.4

The new factory now being built by this company at Marion will allow the handling of more repair work, which it is now often compelled to decline because of the limited capacity of its present plant. It will also afford a laboratory for research in further perfecting the apparatus, and a place to instruct the employees of purchasers in the use of the process.

In the words of the president of the company, Augustine Davis, who has been identified with acetylene work in this country ever since its inception, "The development of the process is scarcely begun and its field is almost without limit, but it is an art which will require intelligence, fertility, patience and experience to secure the marvelous results of which it is capable. Pure oxygen and acetylene and the best apparatus possible to produce are absolute requisites. Short cuts, cheap apparatus and incapable operators are certain to retard progress greatly. Where the process is to be used over and over on the same kind of work a conscientious operator of ordinary ability can within a few weeks become quite expert, but where a very large variety of work is to be performed knowledge of metals, resourcefulness, personal interest and experience are indespensable."

A Structural Steel Punching Record.

At the structural shops of the receivers of Milliken Bros., Inc., of Staten Island, New York City, recently, 143 tons of plates were punched in one day (8 hr., 47 min. to be exact) on one machine tool. The plates were 13-in. flange plates for girders, 5/8 in. and 11-16 in. thick and averaging about 32 ft. in length. The average number of 15-16-in. holes was about 96 to each plate, staggered except at the ends. There were three sizes of plates and varieties of spacing; 52 of one kind, 168 of the second and 96 of the third. The total length of plate handled was 10,036 ft.; weight, 285,850 lb., and total number of holes, 30,384. This work was done on a multiple punch, four plates being passed through at a time. A few days previous to this, one man punched 12,740 9-16-in. holes, one at a time, in 10 hr. This was on light transmission line tower angles, on a light single stroke, quick acting punch. These performances are believed to be records in the line of rapid punching in the bridge shop.

Dunbar Furnace Makes a Large Output.—No. 2 furnace of the Dunbar Furnace Company, Dunbar, Pa., in 1908 made 81,728 gross tons of pig iron, of which 99 1-3 per cent. was standard grades, the only off iron being 24 tons of white and 530 tons of gray mottled. On the present lining this stack up to January 1 has made 158,388 tons and is now making from 250 to 300 tons of pig iron per day. Dunbar by-product coke is used exclusively for fuel and is made in Semet-Solvay retort ovens, located near the furnace.

Returns to the Ironfounders' Society indicate a serious condition among the iron molders of Great Britain. The membership fell off in the year ending with November from 19,375 to 19,046, the decrease being due to lack of employment. The cash balance was £59,609, a falling off in one month of £2298. Total of members "on the funds," 5749, against 5783 in the previous month. Reports from 109 out of 128 branches were that trade was from slack and dull to very bad. In 60 places, where there were 12,434 members, it was described as "very bad."

The Pawling & Harnischfeger Type G Crane.

A new line of traveling cranes with new electrical equipment designed for high efficiency and hard service has lately been developed by Pawling & Harnischfeger, Milwaukee, Wis. The cranes are designated as type G and are equipped with the new type N motors. The tendency is toward a demand for cranes of increased weights, speeds and wearing qualities to conform to present service requirements, and it is for duty of this kind that the new design has been brought out. Fig. 1 shows one of the first installations and Figs. 2, 3, 4 and 5 details of the parts.* The entire crane and all its parts are manufactured and assembled by Pawling & Harnischfeger, which, it is argued, means more perfect harmony or agreement between the several parts.

Fig. 1.—An Installation of the New Pawling & Harnischfeger Type G Cranes in the Standard Cast Iron Pipe & Foundry Company's Plant at Bristol, Pa.

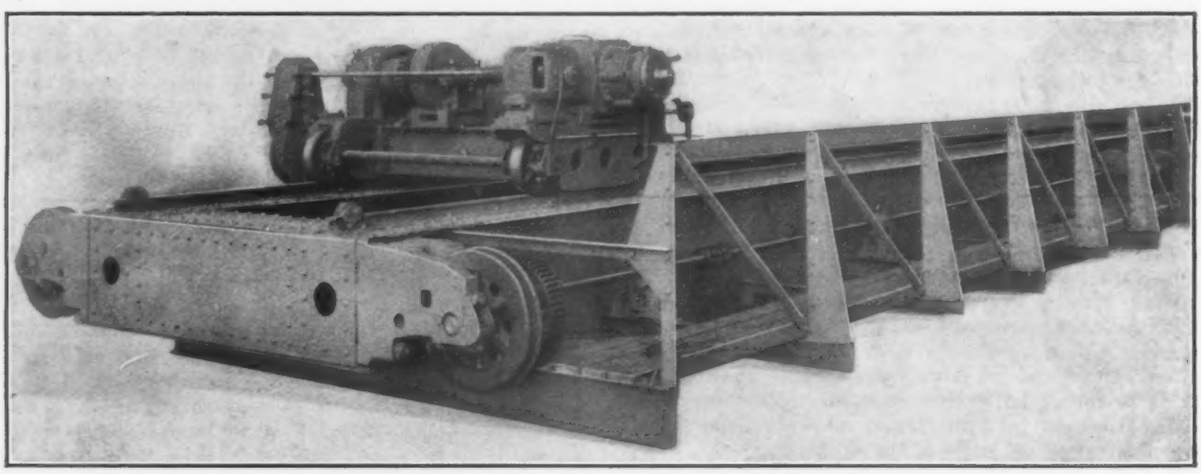


Fig. 2.—A Detail of the Bridge of the Pawling & Harnischfeger Type G Crane.

The bridges, Fig. 2, are composed of riveted box section fish belly girders tied at the ends with structural frames and all riveted to form a one-piece construction. When overhead space allows and it is desired to obtain a higher hook lift the main girders are mounted on end girders that also carry the truck wheels and bearings. In the one-piece construction the bridge is supported on four cast truck brackets nicely fitted to each corner and having substantial through bolts outside to outside of the brackets. Removable oil waste bearings with bronze boxes on each side of the steel tired wheels are readily removed by slightly wedging up the corner of the bridge.

Extending the full length of the bridge on one side is a latticed auxiliary truss supported at each end on channel beams. Horizontal angle bars fastened to the bridge girder and truss carry the motor, gear case and cross shaft boxes, and also the platform or running board. The operating cage with controllers, marble switchboard and foot brake lever and connections is suspended partly from the truss, and usually at the end, clear of the inside of the girder to allow the hook and cables to pass to their full travel. The cage may be located at any part of the span. Connection from the bridge motor brake to the foot lever in the cage enables the operator to stop the bridge travel without having to reverse the motor. Much time is saved by thus having complete control of the bridge travel.

In designing the trolley, Figs. 3 and 4, and the same applies to the bridge drive, it has been the purpose of the

* The trolley shown on the bridge, Fig. 2, is of another design than described for Figs. 3 and 4. The operator's cage, Fig. 5, is shown attached to a different construction from that of Fig. 2.

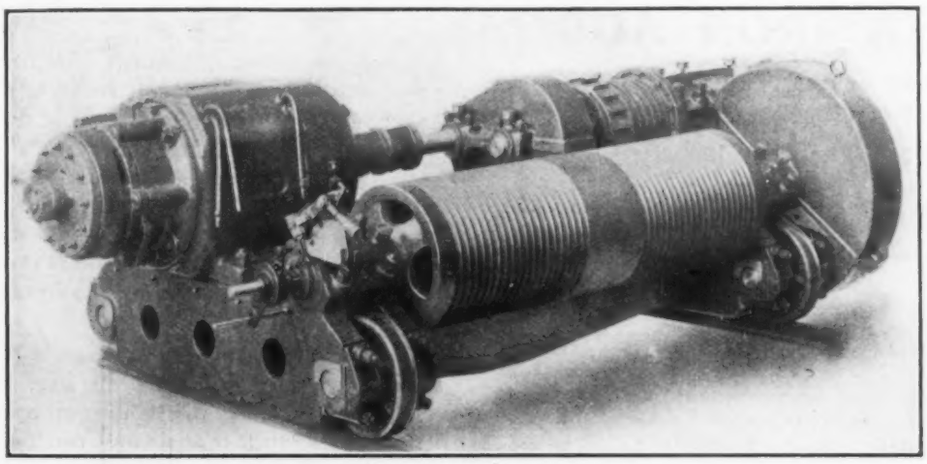


Fig. 3.—The Trolley, Showing the Drum Drive.

builders to make them adaptable to motors of different sizes, for direct or alternating current, and to have each shaft accessible without disturbing another. Except for very high lifts with many parts of cable, single drum trolleys are used, grooved right and left. Machine cut steel spur gearing is used throughout, all encased. The oil waste trolley truck axle boxes are of the same construction as for the bridge trucks, making it an easy matter to remove a wheel or bearing box. Split bronze bushings set and dowelled in bored pockets with bolted caps are accurately fitted for each shaft bearing.

The motors are designed with special reference to crane service and have a great overload capacity. The frames are of cast steel and are fitted with laminated poles. All the field coils are energized. The bronze bushed bearings have ring oiling lubrication. Each armature shaft is removable from the spider on which the punchings are mounted. The armature coils are form wound and provided with good ventilation, which assures low temperature.

The controllers, located in the operator's cage, Fig. 5, have the rheostat resistances banked in frames on which are mounted the circular heads that retain the reversing switches and connections. The operating levers have a forward and return movement which correspond with the several directions of travel of the load hook, bridge and trolley. All connections are made with metal bars securely bolted, yet easily disconnected for making repairs. The levers have an easy movement and short throw, the resistances being so arranged as to provide for the accurate motor regulation essential in good crane practice. A limit switch or safety cut out device attached to the drum shaft bearing box cap has its trip nut traveling on a screw stud in a cap fastened to the end of the drum shaft. The function of the device is to open the hoisting circuit when the bottom block reaches the safe limit of up travel. In this operation the connections are so made that the lowering circuit is not broken, which allows of lowering the hook but necessitates the operators throwing in the safety switch in order to hoist. The wiring is in accord with the underwriters' rules and regulations.

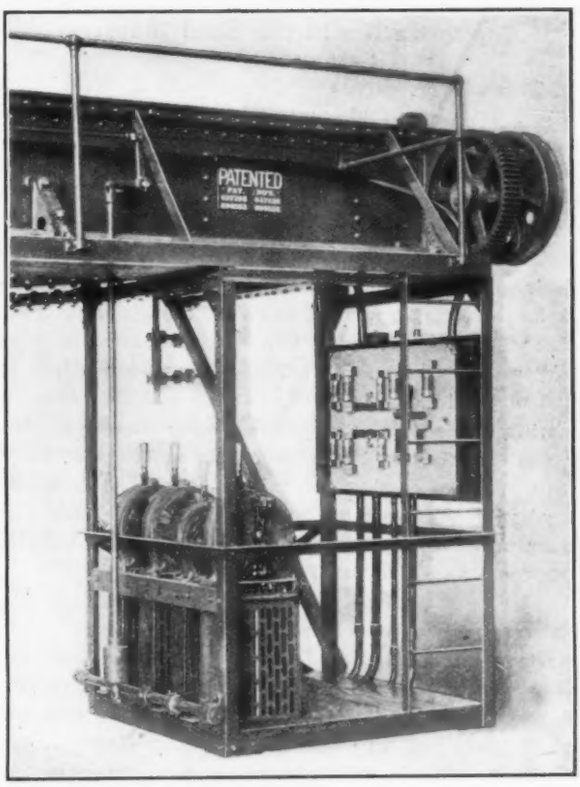


Fig. 5.—The Operator's Cage.

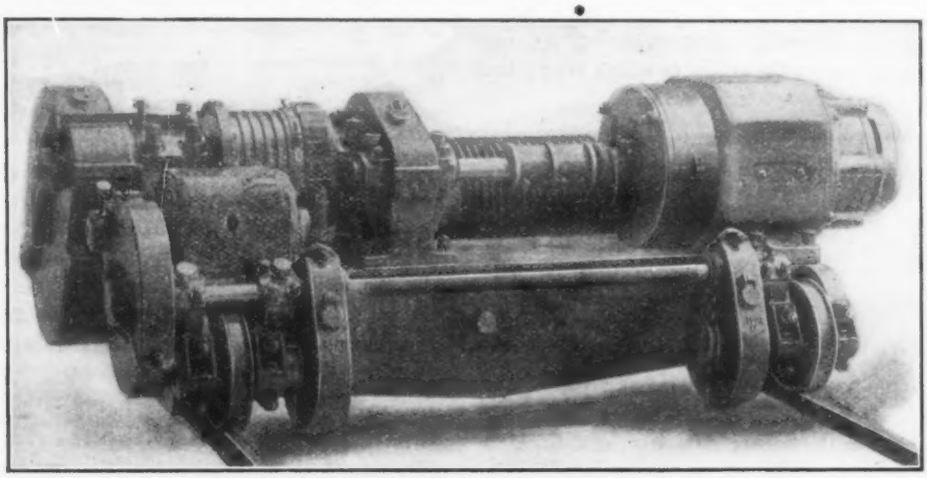


Fig. 4.—Another View of the Trolley, Showing the Travel Drive.

THE IRON AGE

Established in 1855.

New York, Thursday, January 7, 1909.

Entered at the New York Post Office, as Second Class Mail Matter.

DAVID WILLIAMS COMPANY, - - - - - PUBLISHER
14-16 PARK PLACE, NEW YORK

DAVID WILLIAMS, - - - - - PRESIDENT
CHARLES KIRCHHOFF, - - - - - VICE-PRESIDENT
RICHARD R. WILLIAMS, - - - - - TREASURER
GEO. W. COPE, - - - - - SECRETARY

CHARLES KIRCHHOFF - - - - - - - - }
GEO. W. COPE, - - - - - - - - - } EDITORS.
A. I. FINDLEY, - - - - - - - - - }
RICHARD R. WILLIAMS, - - - - - - - - HARDWARE EDITOR.

Capitalization in the Steel Industry.

Through the Bureau of Corporations at Washington efforts have been made to ascertain what is represented by the capitalization of the large industrial corporations, particularly the consolidations. It was natural that such an inquiry should devote much attention to the United States Steel Corporation, since an analysis of its capitalization has been the premier problem of the consolidation doctrinaires. It has been the contention of the school-trained experts on railroad and other industrial questions that when the "legitimate" capitalization of these great corporations was once established it would then not be difficult to decide whether the profits and therefore the market prices of any corporation were excessive. The "physical valuation" proposed for the railroads, of which more was heard when the railroad baiters were in the heyday of their campaign, was based on the delusion that government employees are capable of deciding what is the "real value" of such properties.

The tariff hearing at Washington brought out further expressions from these academic economists. Steel masters examined as to the profits of the steel industry were asked by Congressmen to account for the various increments which brought modest original investments of 40 years ago up to fabulous fortunes—but fortunes made, it should be noted, by selling out. One conspicuous group of millionaires, most of whom looked back over less than 20 years to days of moderate wage earnings, came in for special attention. But Mr. Carnegie's response threw little light on the subject, though his Congressional questioner would have had him believe that facts of vital importance were involved. And when Chairman Gary of the Steel Corporation was interrogated much stress was put by one member of the committee on an inquiry as to the extent to which profits had been capitalized in the steel industry.

A good many things have been capitalized in the United States Steel Corporation, and the Congressional committee will find itself treading a very tangled maze if it attempts at this late day to trace all of them back to the original dollars. It was commonly believed in the year following its organization that in common with other consolidations of that period it represented in part the capitalizing of the country's prosperity. This view was confirmed by the enormous shrinkage in the value of its stock in the temporary departure of prosperity in 1903 and 1904. It will be recalled also that no small factor in the Corporation's earning power, and hence in its capitalization, was reckoned by its promoters to be the exemption from sensational price cutting secured through the purchase of the Carnegie interests. From being lodged in the hands of one man, the power to make prices—a power with limitations, it is true—was transferred to a vast organization having a large stake in the prevention of a trade war.

Another element in the Corporation's capital is the additional steel making capacity it absorbed in its earlier years. These transactions proved to be not the mere heading off of new competition, as was supposed at the time, but in the years of good earnings that followed the additional properties contributed to profits far more than interest on their securities.

The capitalization of pre-eminence in ore is probably the most common explanation of the large increment upon original figures. Under this head expert opinion will have a wide range, but if it be granted that the era of dollar ore in Lake Superior iron mines has arrived, little difficulty will be found in accounting for millions upon millions of hitherto unassigned capitalization.

Mention must not be omitted of a factor whose valuation is high in the scale, though like much else discussed here, it is intangible and cannot be scheduled on balance sheets. It was said by one of the steel masters who testified at Washington that the power that held steel prices in 1908 was the knowledge each manufacturer had that if he made a serious cut he would precipitate a great war and bring disaster to his own company. The past year has given surprising proof that the *entente* between the leading steel companies is much like that between the strongly armed nations; great armaments insure the keeping of the peace. So the Steel Corporation may be entitled to capitalize its share of the policy of conciliation to whatever extent that may bear fruit in the future.

The list of things other than plant which the new era in steel takes account of as a basis for earnings may be further enlarged. We have been capitalizing the new uses for steel which late years have developed, and the world's increasing preference for iron rather than wood. The Steel Corporation may be considered as capitalizing its unique organization—its aggregated talent in so many lines of production and the strength it has gained from its large body of shareholding employees. No small factor in its earning power is its diversity of product. In the past year, when rails and some other heavy lines have suffered severely, this has been of tremendous advantage.

The enumeration might still be lengthened, and many of the things that would be specified, as with many of those mentioned above, would apply equally to the Steel Corporation and the other large manufacturers of steel. There should be no failure to consider, moreover, the vast sums that have been spent on unsuccessful attempts to develop new processes, on plants that were poorly located and that eventually went to the scrap heap—all the outlay that has contributed directly and indirectly to the present day stature of the steel industry of the United States.

That the basis for computing a "reasonable profit" on the steel manufactured in this country is quite beyond the compass of the questions asked at Washington last month is obvious. A parallel inquiry to some of the lines of investigation there pursued would be an effort to assess a proper rental for New York ground in 1909 by searching the records of the original farmland transfers.

Some of the comments on the facts developed at the recent Ways and Means Committee hearings at Washington assume, as members of the committee assumed, that the cost of manufacturing steel is fixed. Having

once ascertained it, the idea seems to be that it can be used as a measuring rod in all matters involving domestic and international prices. Apparently on some such assumption criticisms have been directed at what is called the discrepancy between the cost of steel rails as given in Chairman Gary's testimony and that ascertained by the Bureau of Corporations directly from the books of the manufacturers. Only a little care would have shown that the cost indicated by the Bureau of Corporations inquiry, $22.39, was the average for steel companies producing 93 per cent. of the steel rails rolled in the United States, and was for the five years beginning with 1902 and ending with 1906. The rail cost of $22.81 given in Judge Gary's testimony, on the other hand, was for the Steel Corporation alone and for the single year 1907.

The Problems of 1909.

The coming year will, of course, have problems of its own for business men. While the lamp of experience may afford some light for the future, yet it is not safe to rely too much on our knowledge of what has happened to guide us in determining what we must do in meeting the conditions which next confront us. Although there may be nothing new under the sun, we are from time to time faced by new combinations of old conditions, and it is these peculiar combinations that involve us in perplexity. We can all revert to some unsatisfactory experiences we have had in trying to solve such a problem, and are apt to say that if ever a similar condition should occur we would know precisely what we would do to achieve a great stroke of business. But when something like it does turn up we find it accompanied by other matters having a bearing of more or less importance, and we are fortunate if our decision or non-decision proves to be the correct procedure for the betterment of our income or the preservation of what we had accomplished. He is a wise man, indeed, who will always be able to select from several apparent controlling influences the one which will prove to be the dominant factor and base his action upon that, ignoring the others.

When we look back over the last 15 years we can see how wisely or how foolishly we have met some of the greatest opportunities for business success ever vouchsafed to man. Those who had kept their sails trimmed for the long foretold financial upheaval as a result of the continued heavy injection of silver into our currency were enabled to endure safely the period of depression from 1893 to 1897, but of these prudent people many were too temperamentally cautious to make the heavy investments then which were destined to prove so profitable in the six years of rampant prosperity that followed. Although the majority of the voters of the country had decided in favor of the gold standard, not every business man was able to foresee the momentous results of fully restored confidence following a long period of enforced economy and restrained enterprise. Prudent souls again passed unscathed through the depression of 1903-1904, and again many of them were too deeply influenced by a few unfavorable indications to appreciate the greater strength of those promising betterment, and the hilarious times of 1905-1907 passed while they were looking from month to month for a sudden turn for the worse.

We are now gradually emerging from another plunge in the dark waters of financial distress. Some 15 months have passed since the vessel of prosperity foundered. Compared with previous experiences of a similar character, the mortality was not heavy. Striking recoveries have taken place, financial doctors having safely assisted to convalescence great institutions which were on the verge of dissolution, and thus averted the indefinite prolongation of the excessive timidity and apprehension which are the results of such a catastrophe. Confidence in the stability of our banking institutions appears to have been fully restored. Capital is again seeking investment and appears inclined to take some risk, which is always a necessary precedent to the revival of business enterprise. Plans are doubtless being laid now by the venturesome, who are willing to take the chance of their undertakings turning out profitably in the period of more active trade which is absolutely certain to come and which they hope is near at hand. Others, however, hesitate and ponder well before making any commitments of importance. There are lions in the way. The awful calamity in Italy may make some disturbance in European finances. The tariff is to be revised and may be so radically changed as to cause a widespread readjustment of wages, with its inevitable unfavorable effect on business. The crops may fail, as we have had such an extraordinary succession of years of plenty. We may get embroiled in a foreign war by reason of our participation in the world's politics. The new National Administration may decide to pursue a still more aggressive policy in dealing with large corporations, which would certainly chill all enterprise and thoroughly check any disposition to anticipate the business requirements of the future. These and other matters which might be enumerated are the problems of the year now before us. Who will be the wiser and reap the greater gains? Will it be the business man who fearlessly expresses his faith in the unshaken progress of the country by pressing boldly forward as if there were no such troublesome matters awaiting the solution of time, or will it be the one who waits and wonders, risks no more than he feels is sure to be returned to him and says that 1909 is too uncertain? While the overventuresome may be too rashly estimating the early return of more busy times, the ultra conservative is likely to find them catching him unprepared.

Auxiliary Steam Plants and the Drought.

The drought that recently afflicted so large a part of the most important manufacturing section of the country has strongly emphasized the necessity of auxiliary steam plants in connection with water power. If business had been better the lack of adequate power to turn machinery would have had a more impressive effect. As it is, many manufacturers who have seen the streams and reservoirs upon which they depend depleted of their normal supply of water realize the loss that would have been entailed if the market had demanded the full productive capacity of their works. The paper mills present an excellent example of this; in fact, in some sections of the North and East there is fear that a complete shutdown may be necessary if water sources are not further replenished by rains or protracted thaws.

It is certain that builders of steam power equipment will benefit by the lesson, as there will be a natural tendency to guard against the repetition of such an experience. The New England textile mills came to the conclusion some years ago that it is unsafe and expensive to depend exclusively on water power. In this industry a generation back the steam plant used in connection with a hydraulic installation was comparatively rare, but to-day complete dependence upon water has become quite unusual, except at certain great falls where the supply is independent of seasonable conditions. In some instances,

it is true, the mills have outgrown their water power privileges, and steam has become necessary as a constant partial supply of power. But at the same time the steam installations are usually large enough to operate the entire works, so that low water can prove no detriment. The two powers are being harnessed together in two ways: water is utilized to generate electric power at points distant from manufacturing works and the current transmitted across country to supplement steam plants, while steam is being added to the equipment of establishments otherwise dependent upon water power.

It has been demonstrated time and time again that the investment of an auxiliary steam plant is a profitable one. It is a form of insurance. It provides against compulsory closing down, either wholly or in part, during periods when to cease manufacturing would be a serious loss because of the inability to fill orders and make a profit out of an advantageous market.

The Modern and the Old Foundry.

Attention has often been directed to the fact that in manufacturing plants where the foundry is of secondary importance it is apt to receive less careful study by the management than those departments which have to do directly with bringing out the features of the product. While other parts of the works are watched carefully in the constant effort to effect cost reductions or to improve the product, the foundry is permitted to run on without important change in its equipment. Modern ideas are not introduced to the extent they should be, though by far the largest field for economy may lie in the foundry. The manufacturer who has not turned his attention foundryward and who would investigate the situation in his plant would be deeply interested to learn of the great advance that has been made in equipment. At a recent convention of foundrymen, for example, there were present some who there heard for the first time of the annual exhibitions of molding machines and other foundry equipment. Progressive foundrymen are, of course, well aware of the forward movement, but where the manager is not actively in touch with this department he is too apt to overlook his opportunity. A similar aspect of costs is presented where the manufacturer buys his castings. He may discover that with a modern foundry of his own he can cut this item of cost, perhaps disposing of the surplus product in the market, a not uncommon castings was very large.

In few lines of manufacturing have costs been more vitally affected by equipment for manufacturing and by facilities for handling work. Practical experience by manufacturers who have replaced old foundry plants with new has shown surprising results in the difference in expense of producing. To be sure, the element of labor must always be a very large one in some branches of the industry, but the very fact of the magnitude of the payroll makes the effects of modern methods the more conspicuous, especially where they permit the substitution of unskilled for skilled labor. In the first place the best methods of handling pig iron, scrap and coke mean a great deal. The relations of the loading and foundry floors to the storage and the storage to the transportation constitute an element which has been given much profitable attention in the designing of the best plants. But apart from these essentials and the handling of flasks and castings by cranes and tracks, other modern factors mean great reductions in costs. The proceedings of the foundrymen's associations have been piling up evidence of the great advances made in machine molding. Machines are now in course of designing and test which promise to affect still further the foundry business, especially in reducing the initial cost of high-class equipment.

A large manufacturing concern using many composition castings in its product recently completed a foundry of its own. Its engineers went to great pains to investigate equipment with the purpose of reducing costs and at the same time insuring the quality of the castings. The result is that the foundry can sell at a profit at approximately the cost to the jobbing foundry from which the company previously bought its castings. The difference is largely one of equipment rather than of management or personnel of the working force.

A factor typical of the development of foundry practice and one that promises to become important is the use of the oxyacetylene process in repairing castings. A heavy item of foundry costs lies in imperfect castings, especially those of large size, where breaking up and remelting, combined with the original loss in labor and materials and general expense, mount into a formidable figure. It has been demonstrated that the intense flame of the combination of gases renders it practicable to remedy at a moderate expense many of the defects which develop in the mold. There is another important use for the process, in correcting errors in patterns which are not discovered until after the castings have been manufactured, or in changing the design, where an afterthought has wrought an improvement, or in converting castings of discarded patterns into those of the latest design. Recently a large number of castings for the saddle of a machine tool were found to be lacking a boss, which the patternmaker had overlooked. The iron was useless without this feature. The oxyacetylene flame saved the lot, for the boss was welded on each at comparatively small cost, though all had to be shipped from a city of the Middle West to New England and back. Had the home foundry been equipped for the work the expense would have been much less, and as it was the saving as compared with the total loss of the castings was very large.

Electricity at the Corn Show.—At the National Corn Show at Omaha, Neb., early in December, was exhibited electrical apparatus, suggesting the use of electric power and light for the farm. The Northern Electrical Mfg. Company, Madison, Wis., co-operated with the Alamo Mfg. Company, Hillsdale, Mich., in showing generating units. There was a 1¾-kw. generator driven by a 3-hp. vertical gasoline engine in operation, supplying current for illuminating the exhibit, operating an electric piano, flatiron, &c. An emergency circuit was maintained for supplying light for the entire exhibit in case of a break down in the city current. The gem of the Corn Show was a direct connected Alamo engine and 3-kw. Northern generator all finished in white enamel and nickel plated. The exhibit did much to push the use of electricity for modern homes and farm service. The 1¾-kw. generating unit was honored by the authorities of the exhibition as a prize to the best ½ bushel of wheat.

Fire Losses Stupendous in 1908.—The fire losses for the United States and Canada during the calendar year 1908, says the New York *Journal of Commerce*, aggregate the enormous sum of $238,562,250, figures never before equaled except in two instances, 1904 and 1906, when the Baltimore and San Francisco conflagrations materially inflated the total. Aside from the Chelsea conflagration in April, which destroyed property valued at $10,500,000, there were no sweeping fires of any magnitude, but a steady stream of losses throughout the year and coming from all parts of the country resulted in the unusually large total for the year. The fire losses in this country and Canada during the past 30 years reached the enormous sum of $4,508,888,325, or an average of $140,902,760 per annum.

New Iron and Steel Works Construction.

Improvements Planned for 1909 or That Will Be Carried Over to the New Year for Completion.

Naturally 1908 has no great record of new construction in iron and steel lines. The United States Steel Corporation has been the principal builder of new plant, and the details of its new construction have been given in these columns from time to time. The Gary plant, on which the first of a series of articles appears elsewhere in this issue, has been the largest single operation of the Steel Corporation, and Gary will continue to be the scene of the most important construction work of 1909. Inquiries addressed by *The Iron Age* to the leading iron and steel companies and to many others have brought replies indicating that the programmes of new construction for 1909 are generally small in comparison with those of the years immediately preceding 1908. Some of the large companies have no plans whatever at the present time for new construction or even for improvements of any size in the coming year, having finished in 1908 in several cases work carried over from 1907, which put them in thoroughly effective shape.

Below are given such details as are now obtainable of construction work that will be undertaken in 1909 or that was begun in 1908 and was still in progress at the end of the year. The United States Steel Corporation's programme of new work for 1909, for which new appropriations will be required, is now being made up and definite announcement concerning such construction will probably be made within the next 30 days. It is now more than two years since the Corporation announced any extensive improvement plans. Had there been no panic and depression, its projected work outlined in *The Iron Age* of December 13, 1906, would no doubt have been completed in 1908. As it is, much of this work is still under way, and some of it will not be completed until well along in 1909. It is probable that the Corporation's expenditures for new construction in 1909 will amount to $25,000,000 to $30,000,000, exclusive of outlays made at Gary, Ind. From all present indications the aggregate will be several times the total expenditures for new work by all other companies. In the matter which follows only the important work now in progress and to be completed by the Corporation subsidiaries this year is referred to. In addition, many minor improvements are being made and the mining and transportation companies are constantly making betterments.

UNITED STATES STEEL CORPORATION.

INDIANA STEEL COMPANY.

Two of the new Gary furnaces were put in blast in December. Two others are practically completed. The second group of four is in an advanced stage of construction and can be finished by the middle of 1909. At the open hearth plant 28 60-ton furnaces are practically completed, and the first 14 of these may go in in the next two or three months. A third group of 14 furnaces is in course of construction. The rail mill is completed. In process of construction are the billet mill, universal plate mill, merchant mill and axle plant, and several months will be required for the completion of any one of these.

ILLINOIS STEEL COMPANY.

Of the 280 by-product coke ovens which are being added to the Joliet, Ill., plant, two batteries of 70 each were put in operation in 1908 and 140 are still under construction.

CARNEGIE STEEL COMPANY.

At the Ohio works, Youngstown, Ohio, two blast furnaces and 12 open hearth furnaces provided for in the programme of December, 1906, can be completed within the next four months. Work has not yet been begun on the merchant mills, which were included in the original appropriation. Four Tod gas engines will furnish blast for the new furnaces, and a number of gas engines are being added to the electric power plant. At the Duquesne works two blast furnaces with four gas blowing engines and three 2000-kw. gas electric engines are being completed and can be put in operation within three or four months. Of the 18 open hearth furnaces on which work was begun in 1907, six have been put in operation and the remainder can be finished in three or four months. At the Carrie Furnace plant, while the two furnaces included in the 1906 appropriation were put in operation in 1907, there were many makeshifts in order to hurry them into blast, and work on the power plant and other parts has been carried on for some time. About 6000 hp. in gas engines will be added at the Carrie works to furnish additional electrical power for the cement plant at Universal, Pa., the capacity of which is being doubled, bringing it up to 10,000 barrels a day. At the Clairton works a third structural mill with a capacity of about 60,000 tons a year is under construction.

NATIONAL TUBE COMPANY.

At the Lorain, Ohio, works six 60-ton open hearth furnaces which have been under construction can be completed in four or five months. At McKeesport, Pa., the reconstruction of the plant, which has been under way for five years, will be continued in 1909 and probably finished.

TENNESSEE COAL, IRON & RAILROAD COMPANY.

The authorization of an expenditure for the rebuilding of the remaining three of the six blast furnaces at Ensley was announced in 1908. This work is now in progress and will probably extend over the next 18 months. It involves the building of stockyards, modern bins and complete equipment to make all the furnaces of a thoroughly modern skip filled type. Further expenditures will be made in 1909 in opening up coal mines and in completing improvements at iron mines.

OTHER CONSTRUCTION.

Blast Furnaces.

None of the large steel companies apart from the subsidiaries of the United States Steel Corporation report any new blast furnace construction planned for 1909. A number of merchant furnace interests either have work in progress on new furnaces or have plans for beginning such work in the coming year, or have under way extensive improvements of existing furnaces, which will add to their capacity. Data relating to such work are given below:

One important new project concerning which particulars, including the name of the company, are withheld for the present, involves the building of a blast furnace, an open hearth steel plant and finishing mills, the entire outlay now figured on being $3,000,000.

The Federal Furnace Company, Chicago, Ill., which blew in a new stack in 1908, has another under way, which is expected to be completed about April, 1909.

Corrigan, McKinney & Co., Cleveland, Ohio, as already announced, have acquired a site for a new 350-ton blast furnace at Cleveland, on which construction will be started early in the spring of 1909. It is the intention to have it ready for operation in the early part of 1910. The operating company will be known as the River Furnace & Dock Company. Before the panic of 1907 the company had foundations laid for a duplicate of its furnace at Josephine, Pa. Work was suspended, however, and is unlikely to be resumed in view of the putting forward of the new furnace at Cleveland. The new Scottdale Furnace of this company was completed in 1908, and is now about to be blown in.

M. A. Hanna & Co., Cleveland, Ohio, are going ahead with the plans for two 350-ton furnaces. Work will begin on the site at Buffalo on the Niagara River early in the spring, and about 18 months will be required for the completion of the furnaces.

The Cleveland Furnace Company, Cleveland, Ohio, is completing its No. 2 furnace, 22 x 90 ft., and will be ready to operate it about March 1. Its capacity will be

upward of 400 tons a day, and basic and malleable pig iron will be made.

The Reading Iron Company, Reading, Pa., will rebuild its Crumwold Furnace at Emaus, Pa., which went out of blast in October, 1908. The new furnace will be equipped with skip hoist and stock bins. Work has already begun, and the improvements will probably be completed before fall.

The Virginia Iron, Coal & Coke Company, Roanoke, Va., will repair its furnace at Bristol, Va.-Tenn., in 1909, and probably put it in operation in the last quarter of the year. Its capacity is about 150 tons a day.

Pickands, Mather & Co., Cleveland, Ohio, have some improvements under way at their Ella Furnace, West Middlesex, Pa. A new shell is being built, and the furnace will be equipped with a pig breaker. It is probable that a new cast house will be erected.

The Bethlehem Steel Company, South Bethlehem, Pa., has now under construction at its old or Lehigh plant a blast furnace, 22 x 90 ft., which will have a daily capacity of 600 tons.

Worth Brothers Company, Coatesville, Pa., has under way the erection of a thoroughly modern furnace, 18½ x 85 ft., with a daily capacity of 400 tons. The company is also building an ore bridge and other equipment. The furnace will probably be completed by the late summer of 1909. It is close to the company's open hearth furnaces, and it is the intention to use hot metal direct.

The Thomas Iron Company, Easton, Pa., is making extensive improvements at its Hokendauqua blast furnaces. The No. 1 furnace, which was practically rebuilt in 1908, was put in blast in September, and has been making an average of 1800 tons of iron a week on one ton of fuel per ton of iron. The No. 3 furnace is also being rebuilt, and will be ready for blast March 1, 1909. Both furnaces are being equipped with automatic skip hoist and steel stock bins. A fourth stove has been added to each, and Allis Chalmers cross compound blowing engines have been installed. The No. 6 furnace at Hokendauqua has been relined, and will be put in blast in February. One of the two furnaces at Hellertown is being relined and will go in blast next month, when the Island Park furnace, now being relined, will also be ready for blast. The Brown Hoisting Machinery Company, Cleveland, furnished the furnace tops and stock bins for the improvements at Hokendauqua.

The Empire Steel & Iron Company, Catasauqua, Pa., is building a new stack at its Crane plant to replace the No. 5 furnace. This was an old stone stack built in the early '50s, and afterward topped out with an iron shell. It produced an average of 80 tons a day. On the same foundation the new furnace will be 20 x 80 ft., with a capacity of 250 to 300 tons a day. There will be three Cowper stoves, 20 x 90 ft., and a fourth stove will be erected later. The new furnace will be ready in February. The Catasauqua plant formerly had six stacks, and this number has now been reduced to three, of considerably larger capacity than the original design. The new power installations at this plant include a disconnected cross compound Southwark blowing engine, a Weiss condenser, and several batteries of Rust tubular boilers. The improvements under way at Oxford, N. J., include the raising of the old shell to a hight of 80 ft., the building of a new bosh jacket, the installation of 800 hp. additional of Babcock & Wilcox boilers, and four Cowper stoves, 20 x 85 ft. A new blowing engine will be added. The furnace is expected to blow in in the latter part of February. The Topton, Pa., furnace, now ready for blast, has been considerably improved. A new steel hoist, additional boilers, and more blowing power have been provided. With the above improvements the company's maximum tonnage of pig iron will approximate 28,000 tons a month. Important work is under way at the company's iron mines, and some of the improvements to these properties have been completed recently. The Oxford, N. J., mine, including the well-known Washington vein of magnetic iron ore, now turning out about 10,000 tons a month, with a 58 per cent. metallic yield, has been fitted out with an electric lighting system, and the air power formerly distributed from several points has been located in a central station, containing Ingersoll-Rand compressors. A new shaft is going down on another part of the Oxford property, where a large deposit of magnetic ore practically free from phosphorus and sulphur has been located by diamond drill work. At Mount Hope, N. J., where diamond drill prospects developed over a year ago large bodies of ore previously unknown, the company in addition to further proving the veins operated on since Revolutionary times, has installed an up to date mechanical cobbing plant. It includes magnetic separators of the Ball-Norton type, with a capacity of 15,000 tons per month. A complete compressing and pumping plant has also been built. The ore bodies have been reached by shaft now down 600 ft., and about 800,000 tons of ore has been blocked out, ready for the new machinery.

The Alabama Consolidated Coal & Iron Company, Birmingham, Ala., has plans for extensive improvements, but definite announcement concerning these cannot be made as yet. Apart from the erection of a $50,000 condenser at Ironton, Ala., nothing will be undertaken for a number of months. The reconstruction work of the past two years has added about 30,000 tons a year to the company's blast furnace capacity.

The Youngstown Steel Company, Youngstown, Ohio, has practically completed the rebuilding of its Tod furnace, which has been in progress since July, 1908, and will be ready to blow in, if conditions warrant, by January 15. The new construction includes a steel bin system.

The improvements now under way at the Hudson Iron Company's furnace at Secaucus, N. J., will probably require a full year from the blowing out of the furnace in May, 1908. The new furnace will be 80 x 18 ft., and will have a capacity of 225 tons a day. Four fire brick stoves will replace the iron stoves and new boilers will be installed.

About $200,000 will be spent this year on the properties of the Sheffield Coal & Iron Company, Sheffield, Ala., which is about to pass from the receiver's hands to the reorganization company known as the Sheffield Iron Company. Most of the outlay will go to the erection of additional coke ovens at the company's Glamorgan, Wise County, Va., plant, and to installing jigs at its brown ore mines instead of the old log and trough washers. One of the furnaces will probably be started up in the next 60 days. Under the receivership about $25,000 has been spent on new work, including the building of 21 coke ovens at Glamorgan.

Steel Works and Rolling Mills.

The Reading Iron Company, Reading, Pa., has decided on the building of a new lap weld mill at its tube works department to take the place of an old one.

The Wisconsin Steel Company has under construction at South Chicago, Ill., a two-stand 18-in. motor driven mill for cold rolling rods and shafting. The main building will be 90 x 120 ft. The company is also increasing the capacity of its hot bar mill by enlarging the furnaces and soaking pits.

The Otis Steel Company, Ltd., Cleveland, Ohio, is taking out its 126-in. plate mill and replacing it with a 152-in. mill. The new mill will be ready for operation early in the spring.

The Massillon Rolling Mill Company, Ohio, a new corporation, is building a plant for the manufacture of black and galvanized sheets. It is expected to be ready for operation about March 1 and will employ about 300 men.

The Bethlehem Steel Company, South Bethlehem, Pa., is building four additional soaking pits at its Saucon plant, doubling the present heating capacity.

The Maryland Steel Company, Sparrow's Point, Md., decided some time ago to erect an open hearth steel plant, but whether the work will be undertaken in 1909 has not been determined. Substantial progress has been made in the development of the Mayari ore deposit in Cuba, from which extensive shipments will be made ultimately to the Pennsylvania Steel Company and the Maryland Steel Company. This work involves railroad construction from the mines to Nipe Bay, an ore treating plant at Nipe Bay, together with town site and other accesso-

ries, as referred to in previous issues of *The Iron Age*.

The Lebanon Valley Iron Company, Lebanon, Pa., has under construction a new 16-in. finishing mill of four sets of housings in a building 60 x 260 ft. It is expected that the mill will be ready for operation by next spring.

The Lukens Iron & Steel Company, Coatesville, Pa., has been renewing some departments and improving others in its extensive plate mill plant. Some of this work is still under way. The company has completed in the past year a new chemical laboratory and a new physical laboratory.

The Bettendorf Axle Company, Bettendorf, near Davenport, Iowa, is letting contracts for two 25-ton open hearth furnaces, for its new steel foundry, the plans for which were prepared by W. M. Carr, consulting engineer, New York, last year. The company will erect the steel building which the new plant will occupy.

The Parkesburg Iron Company, Parkesburg, Pa., is erecting as an addition to the finishing end of its tube mill a steel building 85 x 150 ft. It will be served by a traveling crane.

The National Sheet Steel Company, Mansfield, Ohio, has under construction a mill for the production of black and galvanized steel sheets. There will be a 26-in. roughing mill, a 24-in. cold mill and four stands of 26-in. finishing rolls.

The Firth-Sterling Steel Company will install at its Demmler, Pa., works a second electric furnace of the Heroult type, with a capacity of 5 tons.

The Jones & Laughlin Steel Company, Pittsburgh, has lately been rebuilding two of its four open hearth furnaces at Soho. It also has under construction four Talbot open hearth furnaces of 250 tons capacity per day at its American Iron & Steel Works. These are expected to be ready for operation in the early part of 1909. There has been no resumption on a large scale of the work on three blast furnaces at Aliquippa, Pa., which was suspended in 1908.

The Superior Steel Company, Carnegie, Pa., which manufactures strip steel, is adding an open hearth plant which will be ready for operation in the early part of 1909.

The Allegheny Steel Company, Pittsburgh, Pa., has under construction a 20-ton open hearth furnace at its plant at Brackenridge, Pa.

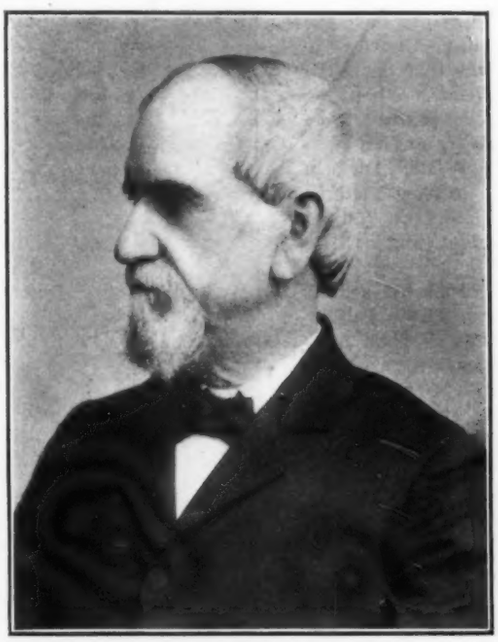
The A. M. Byers Company, Pittsburgh, Pa., carries into the new year the construction work on its extensive new plant at Girard, Ohio, which will consist of 42 puddling furnaces and two finishing mills. The product will be muck bar and skelp, which will be shipped to the company's wrought iron pipe plant at Pittsburgh. The heating furnaces for the Girard mill are being built by Alex. Laughlin & Co., Pittsburgh.

British Steel Castings.—The London *Engineer* puts a question concerning the product of steel foundries in Great Britain as follows: Is it true that commercial steel castings are not obtainable in Great Britain under reasonable conditions of price, delivery and soundness? That magnificent castings are made here cannot for a moment be doubted; every one of our battleships is full of them. That they can be made for the ordinary market in competition with German castings we also believe, but there is much difference of opinion about the matter. Only within the last few days we have been told by two separate and independent engineers that they failed to get sound castings in England, but got them with ease in Germany, and the quality of the metal was superior in every way, while the finish was excellent. On the other hand, we have been told by purchasers that they had no difficulty in obtaining what they wanted in any quantity, and, needless to say, there are many steel makers who ridicule the idea that German castings are better than British. Where does the truth lie?

There are indications that Germany will be among the first of the European countries to seek advantage in an arrangement with America to secure minimum rates under the terms of the new tariff act, which is expected to be passed at the special session of Congress.

The Retirement of Stanley G. Flagg, Sr.

Stanley G. Flagg, Sr., whose name has been so long prominent in the malleable casting industry, retired on January 1 from the firm of Stanley G. Flagg & Co., Philadelphia. Mr. Flagg founded the business in 1856, and until recent years has been closely identified with its growth and development. For most of these 52 years he has followed a practically uninterrupted régime of daily attention to the details of manufacture, seldom absenting himself from his office even under severe stress of circumstances. Until a few years ago he made a trip also each week to the Pottstown, Pa., plant. He was born in Whitesboro, N. Y., March 13, 1830, and spent the early years of his life in Boston, Mass. In his early manhood, after some experience at Philadelphia in the dry goods trade, which he found uncongenial, he looked up the business of making malleable iron pipe fittings and castings, and soon established a plant in Frankford, a suburb of Philadelphia. As one of the pioneers in this line of work he encountered obstacles in manufacturing which long made the malleable trade one of peculiar difficulty. He



STANLEY G. FLAGG, SR.

was probably the first to make malleable pipe fittings entirely in one plant, the machine shop and foundry engaged on this work having been separated previously.

In 1860 Mr. Flagg built shops at Front street and Girard avenue, Philadelphia, and in 1865 bought property at Nineteenth street and Pennsylvania avenue. Here a second plant was acquired, which was enlarged and rebuilt in 1879. Both plants are still the property of the firm. The Pottstown works were started in 1896 and today employ almost 700 persons. In good times the present capacity of the firm represents about 1000 employees. The manufacture of small steel castings was begun in 1873. Samples of these products were exhibited at the Franklin Institute fair in 1874, and a bronze medal was awarded. A further exhibit was made at the Philadelphia Centennial Exposition in 1876 and recognized by a medal.

Mr. Flagg's dealings with his employees have evidently been mutually satisfactory, little occurring in the long stretch of years to disturb the harmony of these relations. He will no doubt still maintain his personal interest in the success of the enterprise he has created, and to which he has devoted himself long after the time when most men seek release from such responsibilities. Stanley G. Flagg, Jr., has been associated with his father since 1882, and upon him now devolves the sole management of the business.

William B. Dickson.

William B. Dickson, who has just been appointed first vice-president of the United States Steel Corporation, was born in Pittsburgh in 1865, and at an early age left school to enter business, his first permanent employment being late in the seventies with the Pittsburgh Telephone Exchange, then a new undertaking. It was in 1881 that he first became identified with the steel industry, entering the mill of what was then the Pittsburgh Bessemer Steel Company, at Homestead. For three years he was active in the converting, blooming and rail mills, and then was attached to the mill office. In 1889 he was transferred to the general office of the Carnegie Steel Company, at Pittsburgh, his work being largely in the order department, adjusting the relations between the customers and the mill, after the orders had been booked.

In 1899 Mr. Dickson was admitted to the partnership of the Carnegie Steel Company and a year later was appointed managing director of the company, Charles M. Schwab then being the president. When the United States Steel Corporation was formed Mr. Dickson came to New York as the assistant to the president, and a little less than a year later was appointed second vice-president. In that capacity he has been the head as president of the Minnesota Steel Company and of the Union Steel Company, subsidiary companies of the United States Steel Corporation.

WILLIAM B. DICKSON,
First Vice-President of the United States Steel Corporation.

A Nodulizing Plant at Benson Mines.—The Benson Mines Company, Benson Mines, N. Y., will award contracts in time to start construction by April 1 on a nodulizing plant in connection with its operations at Benson Mines. Capacity will be provided for nodulizing 400 tons of fine ore and dust from the concentrating plant in 24 hr. The building will be of steel construction, 50 x 224 ft., and will be equipped with two rotary kilns, each 100 ft. long. The fuel will be supplied by four gas producers. The hot gases after leaving the kilns will pass to the waste heat boilers and raise the steam required to drive the engines. If the plant meets with the success contemplated the company will install additional kilns of about the same capacity.

The Industrial Works, Bay City, Mich., has the steel work for the superstructure of a new foundry building in place which will be completed as soon as operations can be resumed in the spring. The plans contemplate a 10-ton open hearth steel furnace; also a gray iron foundry furnished with the most modern appliances throughout. The equipment for this improvement will not be purchased for some time.

Customs Decisions.

Tin Disks.

The board has granted the claim of the Central Vermont Railroad Company in protests dealing with the classification of disks or circles of tin plate varying from 1.5 to 3 in. in diameter. These disks are cut or stamped out of sheets of tin plate in the manufacture of tin cans and are the pieces removed from the tops of the cans to provide an aperture for filling. Duty was assessed on the merchandise at the rate of 1.5 cents per pound as merchandise made from tin plate. The importer set up the contention that the disks should be allowed to come into this country as articles composed of metal with duty at the rate of 45 per cent. Acting in harmony with a recent decision of the Circuit Court of Appeals in which the Government has acquiesced, the board sustains the claim.

Trout Flies.

A decision has been handed down by the Board of General Appraisers holding that trout flies must be regarded as manufactures of metal for the purpose of assessing duty. It was the contention of the Whitney Sporting Goods Company, Denver, Colo., that the merchandise should be returned as "manufactures of gut," calling for a duty of 25 per cent. After an investigation the board reaches the conclusion that the component material of chief value in the flies is metal. On this account, the classification imposed by the customs authorities is affirmed. A similar contention raised by Wilfred Schade & Co., St. Louis, is also overruled.

Welding Material.

Metal and borax welding material has been decided by the Board of General Appraisers to be dutiable at the rate of 45 per cent. under the provision in the tariff for manufactures of metal, or of which metal is the component material of chief value. The Chicago Metal Reduction Company set up the claim that the article is dutiable either as a mineral substance or else as an enumerated or unenumerated article under section 6. The board finds that the classification complained of is correct and that the return made by the collector of customs must stand.

No. 2 Isabella Furnace of the Carnegie Steel Company at Sharpsburg, Pa., was put in blast December 29, on ferromanganese, to make up a shortage in supply of this material which the Carnegie Steel Company is experiencing at present. The furnace will make about 200 tons of ferromanganese per day. Nos. 1 and 3 Isabella furnaces, which have been idle for a year or more, will probably not be put in blast for some time.

David G. Kerr.

David G. Kerr, who was recently appointed second vice-president of the United States Steel Corporation, has been actively engaged in the steel business for the past 25 years, and during this entire period has been connected in various capacities with the Carnegie interests, having been a partner in the Carnegie Steel Company, Ltd. He was born at Conemaugh, Cambria County, Pa. Robert H. Kerr, his father, was for many years a locomotive engineer on the Pennsylvania Railroad, and in 1873 moved with his family to Wilkinsburg, Pa.

Mr. Kerr attended the public schools in Pittsburgh and spent two years at the Western University of Pennsylvania. He then entered Lehigh University and graduated from that institution with the class of 1884, receiving the degree of bachelor of metallurgy. During vacation periods he was employed at the Homestead Steel Works and Edgar Thomson Steel Works of the Carnegie Steel Company. After his graduation he began work in the laboratory of the Edgar Thomson Steel Works. In 1886 he was placed in charge of the laboratory, and within a short time thereafter was appointed assistant superintendent of blast furnaces under James Gayley. In 1893 he succeeded Mr. Gayley as superintendent of blast furnaces.

DAVID G. KERR,
Second Vice-President of the United States Steel Corporation.

In 1900 Mr. Kerr was appointed ore agent of the Carnegie Steel Company and was transferred to the general offices of the company in Pittsburgh. He has remained with the company in that capacity up to the present time, and during the last several years he has had direct charge and control of the distribution of ore, limestone and other raw materials to the various furnaces of the United States Steel Corporation.

Mr. Kerr was elected a member of the Board of Directors of the Carnegie Steel Company in 1903, and is also an officer and director in several of the allied railroad, dock and limestone companies, including, among others, the Bessemer & Lake Erie Railroad Company, Pittsburgh & Conneaut Dock Company, Pennsylvania & Lake Erie Dock Company and Pittsburgh Limestone Company, Ltd. His experience has been such as to give him a thorough knowledge of the requirements of both blast furnaces and open hearth furnaces, and also of the distribution of raw materials. He is, therefore, well equipped to perform the broader duties of the position to which he has been called. He resides with his mother and sister in Wilkinsburg, Pa.

Nodulizing Chateaugay Iron Ores.—The Northern Iron Company has been operating for some time at its Standish, N. Y., furnace a plant for clinkering or nodulizing the finer Chateaugay concentrates used at this furnace, as well as the flue dirt produced. The plant consists of one 8 x 100 ft. rotary kiln, with conveyors, bins and power equipment. It is electrically driven and uses for fuel a mixture of powdered coal and blast furnace gas. The capacity is 150 tons of clinker a day.

The Carnegie Steel Tie and Rail Joint.

An illustrated pamphlet of 62 pages has been prepared by the Carnegie Steel Company dealing with the steel cross tie and the Duquesne rail joint manufactured by that company. The evolution of steel cross tie design is traced and the reasons given for finally settling upon the modified I-beam type, many thousands of which have been put in track in the past five years and are now in service under all conditions of traffic. It is stated that in the endeavor to create a tie for steam road requirements so many other channels were opened up that to meet them eight designs have been perfected, ranging in weight from 3.2 to 20 lb. per foot. Various types of fastenings have been tried, and while the bolt and clip serve all ordinary purposes, the company has designed a wedge fastening for use in connection with its heaviest tie, or M-21 section. For concrete track construction for urban and interurban electric roads a special shape has been designed, which insures positive anchorage and at the same time is free from buckling. In view of the great expense of constructing and repairing the tracks of such lines the standard steel shape embedded in concrete is believed to meet the situation well. An examination of ties which have been laid in such service and later were removed showed no evidence of electrolysis. The names are given of 21 steam railroads and of 27 electric roads using steel ties. The Duquesne joint has been in service four years. It is described as a reinforced angle bar, the reinforcement being limited to the base. It is secured by turning the metal downward and inward from what would be the outer edge of a plain angle bar. The first cost of this reinforced joint is greater than of a plain angle joint, but it is stated that the saving in maintenance, rail wear and rail bonding more than equals this.

The furnace of the Robesonia Iron Company, Ltd., Robesonia, Pa., was blown in December 29, 1908. Since it was blown out in July the furnace has been improved by the addition of a McClure three-pass stove 18 x 85 ft. and gas purifiers on both stove and boiler sides. The stack is 79 ft. high and is lined to 11-ft. hearth, 18-ft. bosh and 13-ft. stock line. Cornwall ore mined by the company is used exclusively.

Tariff Revision Proceeds Slowly.

The Metal Schedule to Be Comprehensively Revised.

Iron Ore and Scrap May Be Free and Heavy Steel Products May Be Cut 50 Per Cent.

WASHINGTON, D. C., January 5, 1909.—The Ways and Means Committee has now devoted a full fortnight to the consideration of the new tariff bill in executive session, but less progress has been made in the actual fixing of rates than would be gathered from the statements now appearing in the daily press. This will readily be understood when it is remembered that more than 6500 pages of hearings and briefs and an equal volume of matter gathered for the committee by the special agents of the Bureau of Manufactures and other experts in various fields are now before the committee and must be classified and digested before any intelligent adjustment of rates can be attempted.

It is possible, however, to state briefly the fairly well settled determination of the committee with respect to the treatment of certain schedules based upon the necessity of obtaining a much greater revenue than at present and upon the desire to cheapen the cost to the consumer of as many articles as possible. The revenue factor is controlling, however, for the committee appreciates that as to the great majority of items covered by the tariff any reduction in duty will probably be absorbed by manufacturers, wholesalers and retailers. A fairly even distribution of benefits among these classes, however, will be regarded as an important gain to the public, especially if it operates to increase the profits of small merchants and aids in the maintenance of the present standard of wages to workingmen, clerks and other employees.

The committee has already devoted considerable attention to Schedule A, which embraces chemicals, oils, paints, drugs, &c., and a strong disposition has been manifested to reduce the rates on a considerable number of so-called medicinal chemicals from 25 per cent. ad valorem to approximately 15 per cent. Schedule B, covering earths, earthenware, glass, &c., will be taken up with a view to a complete reclassification of plate and window glass. Duties are now based upon extreme dimensions, but under the revised bill they will depend upon net superficial area regardless of special dimensions. The rates on the larger sizes of glass will probably be reduced while the new classification will operate as a readjustment of the rates on smaller sizes.

The Metal Schedule of Overshadowing Importance.

The problem of overshadowing importance confronting the committee is the revision of schedule C, embracing metals and manufactures thereof, which is destined to be more comprehensively revised than any other schedule of the tariff act. Notwithstanding the perplexity in the minds of the committee due to the conflicting testimony of such recognized experts as Messrs. Schwab, Gary and Carnegie, the conviction has been borne in upon Chairman Payne and his associates that the duties on iron and steel can be largely reduced without injury to any interest entitled to consideration. Just how the pruning knife can be applied without affording special advantages to the United States Steel Corporation is the question to which the committee is giving very serious consideration. Two salient points are accepted by all members of the committee as incontrovertible; first, that the United States Steel Corporation can make steel, especially in the heavy forms of rails, billets, structural steel, &c., somewhat cheaper than all of its competitors, with possibly one or two exceptions; and, second, that the big consolidation, because of its financial strength, its excellent business organization, its command of raw materials and its system of distribution, would have an advantage over its rivals even if its mill costs were no lower, an advantage that would enable it to operate successfully under conditions that would cripple, if not destroy, some of its competitors. How to reduce existing rates of duty on the most equitable basis is the problem, and although the metal schedule has not yet been taken up in detail, the committee has already developed some tolerably clear views on the subject.

The testimony taken during the recent hearings shows that the plants located at Pittsburgh and other interior points are protected not only by the tariff duty, but by the ocean and inland freight rates, while those located at the Atlantic seaboard have no inland freight rate differential. The plants at Pittsburgh, Chicago and other eligible locations are advantageously situated with respect to supplies of ore and fairly well with respect to fuel, while the steel plants on the Atlantic Coast must bring both fuel and ore from a considerable distance and the ore largely from Cuba.

Ore and Scrap Free and Steel Products Cut Heavily.

Under these conditions serious consideration is being given to the placing of iron ore and scrap iron and steel on the free list. A heavy cut is foreshadowed in the duty on steel rails, billets, structural steel, &c., and it is probable that the reduction will amount to at least 50 per cent. The conviction seems to be strong in the minds of the committee that it is not wise to attempt to encourage the manufacture of these products on a small scale, and it is believed that with half the protection afforded by the present law any plant which can reasonably hope to succeed in their production under normal conditions can compete with foreign manufacturers.

The duty on tin plate will be cut with the consent both of independent manufacturers and the Steel Corporation. The independents have agreed to a reduction from the present rate of 1.5 cents to 1.2 cents per pound, and Judge Gary is authority for the statement that the United States Steel Corporation could stand a rate lower by at least 10 per cent. It is even possible that the rate will be reduced to 1 cent per pound, although this is not probable, for, although the committee realizes that any rate that will protect an independent producer will probably give an additional profit to the Steel Corporation, it is deemed wise to encourage the establishment and maintenance of independent plants provided they are "economical units" in the sense that they can make tin plate as cheaply as any concern not extraordinarily favored by location or special resources.

The very frank statements made to the committee by Walter Wood of R. D. Wood & Co. regarding the ability of the manufacturers of cast iron pipe to stand a cut have made a deep impression, and it is probable that the rate on this article will be reduced to a basis of about $3 per ton above pig iron. Whether pig iron shall also be cut is a serious question, in view of the development in recent years of its production by independent manufacturers in the South.

There is no apparent disposition on the part of the committee to make heavy reductions in the less important items of the metal schedule, and it appears to be recognized that the relatively small producers of specialties need at least a large proportion of their present protection. There are indications that the duty on lead ore and on pig lead will be cut, and that zinc ore, now held by the Board of General Appraisers to be free except in certain minor forms, will be placed on an equality with lead ore.

W. L. C.

The Commercial Testing & Engineering Company announces the opening of offices and laboratories in the Old Colony Building, Chicago, specializing along the lines of boiler room economies, coal analysis, heat value method of purchasing fuel and coal washing and preparation for operators. The company is thoroughly equipped to handle this class of work in an efficient manner. Edward H. Taylor is president; Harry W. Weeks, vice-president; W. D. Stuckenberg, treasurer, and B. J. Maynes, secretary.

A deficit of $64,288,463 for the first six months of the new fiscal year is disclosed by the United States Treasury statement for the beginning of 1909. The following decreases occurred as compared with the corresponding period of 1907: Customs, $27,680,000; internal revenue, $4,000,000; miscellaneous sources, about $3,000,000. The expenditures increased $33,000,000.

NEWS OF THE WORKS.

Iron and Steel.

In the recent shutdown of Hamilton Furnace, Hanging Rock, Ohio, it was equipped with a new hearth.

The Warner Iron Company's furnace at Cumberland Furnace P. O., Dickson County, Tenn., blew out December 24 for relining and repairs which will require about 10 weeks for completion.

Globe Furnace, at Jackson, Ohio, which has been under repair for a number of weeks, was expected to blow in this week.

The wire and nail departments of the plant of the Youngstown Sheet & Tube Company, at Struthers, Ohio, have been closed down and will be idle for about four weeks, during which time a new 2500-hp. Tod Corliss horizontal vertical engine will be installed to replace a small Tod engine which formerly operated the plant and which will be taken out. The new engine was built by the William Tod Company, Youngstown, Ohio. During the shutdown for the making of improvements the new machinery in the other parts of the plant, which are nearly completed, will be connected up. The rod mill has been double stranded, doubling its capacity, and the new wire and galvanizing and barb wire departments are about finished and will be started during this month.

No. 1 furnace of the Alabama Consolidated Coal & Iron Company, at Gadsden, Ala., has been banked temporarily on account of shortage of coke.

General Machinery.

J. E. Conant & Co., auctioneers, Lowell, Mass., last week sold the plant and equipment of the Eastern Shipbuilding Company at New London, Conn. In addition to the buildings, wharves, &c., there were over 2000 lots of equipment disposed of to bidders from all parts of the East, including several shipbuilding companies, machinery dealers and manufacturers, boiler makers, &c.

The Wilbraham-Green Blower Company, Pottstown, Pa., is now operating its new plant located on the Philadelphia & Reading Railroad. With its greatly improved facilities the company is able to take care of the increase in the demand for its product.

The San Antonio Machine & Supply Company, San Antonio, Texas, has increased its capital stock from $150,000 to $250,000, the $100,000 additional being subscribed by the old stockholders at the rate of $125 for each $100 share. With a surplus of $108,000 on hand, the capital of the company now amounts to $358,000.

The crane equipment for the improvements in the plant of H. Brewer & Co., Tecumseh, Mich., consists of two 8-ton 30-ft. span cranes, two 5-ton cranes, one 8-ton pillar crane and several trolleys and hoists for overhead I-beam track. The equipment is being furnished by Northern Engineering Works, Detroit, Mich.

Receiver Frederick W. Whitridge of the Union Railway Company, New York, has filed plans for a street car barn for the Forty-second Street, Manhattanville & St. Nicholas Avenue horse car line, to be erected on Manhattan street near Twelfth avenue. It will be 114 x 181 ft., of brick construction, and will cost about $50,000. Plans have also been filed for the erection of a power house on Brook avenue near 165th street.

George F. Hunt, president of the Southern Hydraulic Engineering Company, Atlanta, Ga., has purchased for $290,000 the plant of the N. P. Pratt Laboratory, and will shortly incorporate the business as the Pratt Engineering & Machine Company with a capital stock of $700,000. N. P. Pratt will continue as president and George L. Pratt as vice-president. The company has orders on its books for a large amount of sugar mill machinery for Cuba.

George E. Hannah, Paterson, N. J., who was connected for about 17 years with the Rogers Locomotive Works, occupying the positions of clerk, secretary, treasurer, purchasing agent and assistant to the president, and George Cartwright, who has also been in the locomotive business for about 30 years and another Rogers shop employee, have organized the Triad Machine Company and have leased the building at 159 Ward street, where they will manufacture machinery and do machine repair work. Mr. Cartwright will have charge of the shop and Mr. Hannah will look after the business end. The present machinery requirements have been purchased

The Jordan Machine Company, Cohoes, N. Y., has been incorporated by Cornelius Jordan, John F. Quinn and Walter H. Wertime, and will engage in general machine and repair business.

Bridges and Buildings.

The Memphis Steel Construction Company, Memphis, Tenn., has been incorporated with a capital stock of $100,000, to manufacture structural steel and iron for building work. The company, which has not yet completed its organization, expects to purchase the old plant of the Odlum-Taylor Boiler Works in North Memphis, and expects to be ready for business some time this month. C. A. Hunt will be manager. Those connected with the enterprise, all of whom are prominent business men of Memphis, include George R. James, W. A. Hein, S. B. Anderson and T. K. Riddick.

Owing to the fact that the Hedden Iron Construction Company, Newark, N. J., has had under consideration for some time the erection of a new plant to take the place of the temporary one established last year, the report that the company has in course of construction a two-story building at Mt. Pleasant avenue and Oriental place, has led to the rumor that the company is now constructing its new plant. The building which the company is erecting is not for its own use, but is to be occupied by another company which does not wish to have its name connected with the work for the present. The Hedden Iron Construction Company has not yet definitely decided upon plans for its own new plant.

Foundries.

W. R. Parry & Son, wholesale hardware merchants, 29 Liberty street, Utica, N. Y., have purchased the foundry at 314 Catherine street. Improvements to the plant have already been made, and Mr. Parry will conduct the foundry in connection with his present hardware business. The plant has not been in operation for some time past.

Fires.

A fire at the shop of the Burns Boiler Company, Green Bay, Wis., December 27, damaged the building, motors and machinery to the amount of about $5000. Orders have been placed for new motors and machines, and the shop will be in operation again within a few weeks.

The plant of the Electric Heating & Mfg. Company, at Alhambra, Cal., was burned December 18, the loss being about $15,000.

A large part of the plant of the Snell Mfg. Company, Fiskdale, Mass., manufacturer of auger bits, was burned January 5, with a reported loss of $100,000.

Hardware.

The Republic Metalware Company, Buffalo, N. Y., will build a one-story addition to its plant, to be used as a smelter room.

Miscellaneous.

Reports that the Harbison-Walker Refractories Company, Farmers' Bank Building, Pittsburgh, has leased 150 acres of coal lands along the Susquehanna River near Clearfield, Pa., to supply coal for its firebrick plants at that place, are officially denied.

The fireproofing department of the Youngstown Iron & Steel Roofing Company, Youngstown, Ohio, recently destroyed by fire, has been rebuilt and it is now in full operation.

The Standard Boiler & Iron Plate Company, Niles, Ohio, is erecting at the Consolidated Works of the American Steel & Wire Company at Cleveland, Ohio, two self-supporting steel stacks 160 ft. high.

The American Hide & Leather Company, Ballston Spa, N. Y., and Chicago, is having plans prepared and will take bids some time in February for the construction of a three-story tannery building, 44 x 225 ft., and a one-story bark mill, 50 x 86 ft., to be erected at Ballston Spa.

The Benton Insulating Company has been incorporated at Binghamton, N. Y., with a capital stock of $50,000, to manufacture electrical apparatus. C. F. Riddle, E. J. Baldwin and T. Alison of Elmira, and J. S. Wheeler, Penn Yan, N. Y., are the incorporators.

The Standard Scale & Supply Company, Pittsburgh, reports that during the year just closed its plant at Beaver Falls, Pa., has been in continuous operation, although not on full time, with the exception of a few days in the early part of July. The depression resulted in new construction work being practically abandoned, and this business being cut off, the company immediately sought a new outlet for its product, with the result that early in 1908 it closed contracts with some of the large packing houses, and since that time has been supplying the entire scale requirements of Swift & Co., Morris & Co., National Packing Company, Libby, McNeill & Libby, Schwarzschild & Sulzberger Company, G. H. Hammond Company and associated interests. Since the election it has received a large number of important orders involving new construction work, deliveries on which will run over into this year. Its export trade also has been broadening materially, and large shipments are being made to England and a number of the Eastern countries, such as India, Burma and the Philippines, and also to Mexico, Cuba, Porto Rico, the British West Indies, Uruguay and the Argentine Republic. Last year the Standard Scale & Supply Company commenced the manufacture of a batch concrete mixer which has met with ready sale and prospects for future business look encouraging.

The New York State Steel Company's Reorganization.—Plans for the reorganization of the New York State Steel Company, Buffalo, N. Y., which passed into the hands of receivers November 6, 1907, have been worked out to a successful conclusion, and an order of the court has been granted discharging the receivers. The reorganization plan includes the increase of the capital stock of the company to $3,500,000, by the addition of $1,000,000 in preferred stock, all of which has been subscribed; the majority of it being taken by Pennsylvania interests, which hereafter will have the control

and management of the company, and the remainder taken by Buffalo business men. At the annual meeting of the company to be held January 12 a new Board of Directors of the reorganized company will be elected and new officers will be chosen. The work of completing the company's blast furnace and auxiliary works will now be proceeded with. The ore mining properties of the company, located in Minnesota, have been handled to the best advantage by the receivers who have progressed with the work of development to such an extent that 700 tons of ore per day are now being mined. The fact that the company had sagaciously acquired mines of sufficient capacity to furnish its furnaces with ore for many years to come was largely instrumental in influencing the outside interests to come into the organization. Great credit is due to the president of the corporation, Spencer Kellogg, for the persistent and intelligent efforts which he brought to bear in the working out of a plan of reorganization that apparently insures a successful future for the company.

The Pig Iron Curve for 1907-1908.

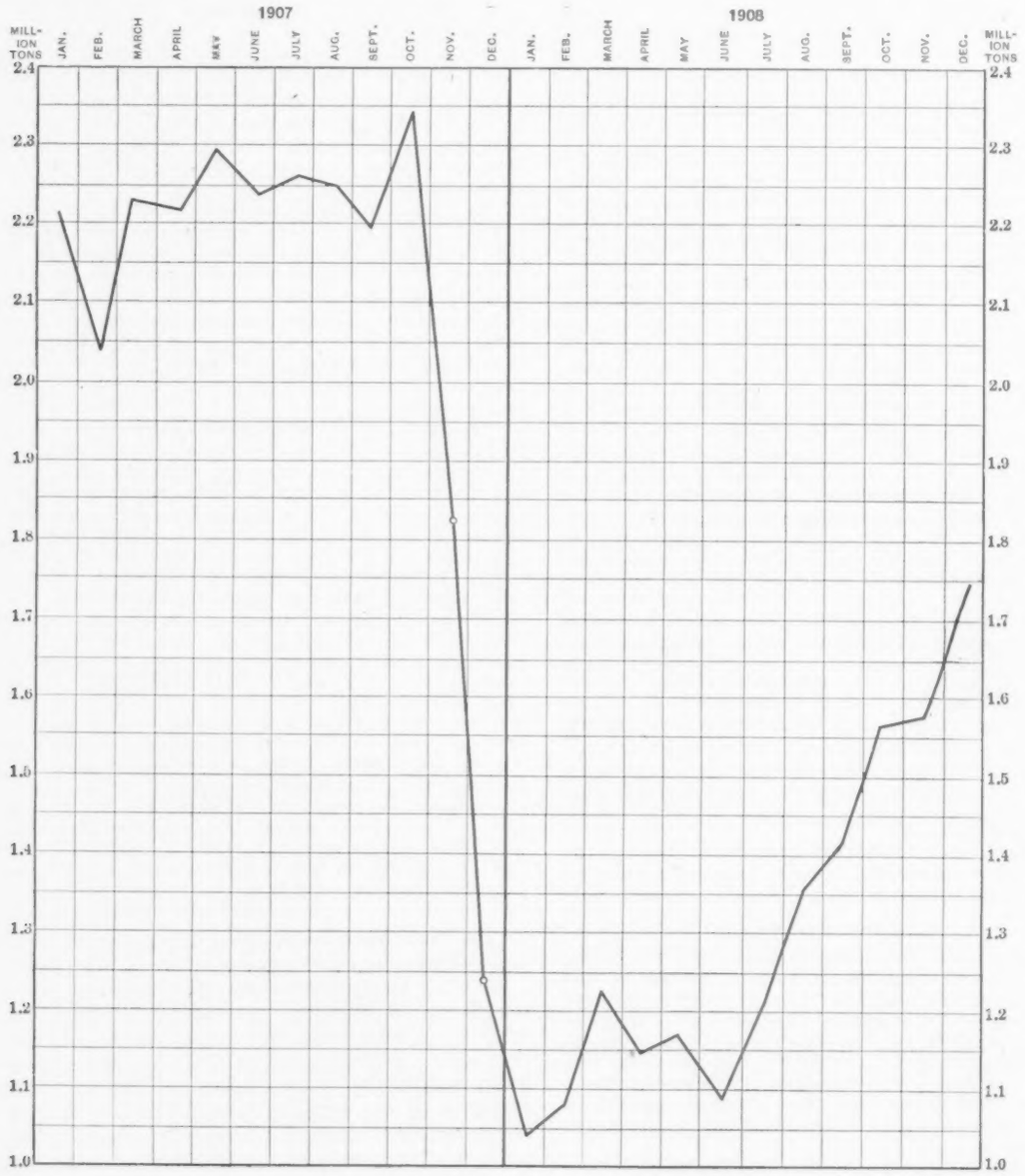
Nineteen hundred and eight ended with pig iron production at high point. This reversed the order of 1907, when the year closed with the curve of pig iron output plunging almost perpendicularly. In January of 1908 the low point of the after-panic curtailment was reached. Then came two months of ascent, followed by three months of alternating decline and advance, resulting in a second low dip in June. In the second half of the year the increase was uninterrupted, the largest gains being recorded in August, October and December, the last named being the banner month in this respect.

The accompanying diagram is platted from *The Iron Age's* monthly statistics of the production of coke and anthracite pig iron in the past two years. No two years in all the history of the industry could have been selected presenting such a contrast. Roundly the production of coke and anthracite pig iron last year was 62 per cent. of that for 1907, a falling off of 38 per cent. The greatest previous falling off in a single year was that of 1893, when the output was 7,124,502 gross tons of all kinds of pig iron, or 22 per cent less than the total of 9,157,000 tons in 1892. The following table gives the figures on which the accompanying diagram is based:

Production of Coke and Anthracite Pig Iron in the United States by Months in 1907 and 1908.—Gross Tons.

	1907.	1908.
January	2,205,607	1,045,250
February	2,045,068	1,077,740
March	2,226,457	1,228,204
April	2,216,558	1,149,602
May	2,295,505	1,165,688
June	2,234,575	1,092,131
July	2,255,660	1,218,129
August	2,250,410	1,359,831
September	2,183,487	1,418,998
October	2,336,972	1,567,198
November	1,828,125	1,577,854
December	1,234,279	1,740,912

December production was at the rate of 20,000,000 tons a year of coke and anthracite pig iron, or close to 80 per cent. of the average rate of production of such iron in 1907.



Fluctuations in Coke and Anthracite Pig Iron Production in the United States in 1907 and 1908.

Iron Output Mounting.

December Production 1,740,912 Tons.

Total Pig Iron Output for 1908 Estimated at 15,873,000 Tons.

December production of coke and anthracite pig iron was 1,740,912 tons, a sharp increase over the November record. What is now being witnessed is the reverse of what was happening one year ago, though that downward movement was more pronounced than the present one in the opposite direction. The blowing in of the two Gary furnaces, one stack at Donora and two at Mingo and the excellent work of the two new stacks of the Youngstown Sheet & Tube Company are telling strongly on steel making pig iron output, and account in large measure for the advance to 400,894 tons a week in active blast furnace capacity at the beginning of this month. This is at the rate of 20,800,000 tons a year, or about 1,000,000 tons a year more than the rate of one month ago. The number of furnaces in blast was 220 on January 1, or 10 more than on December 1, and the number then active was 10 more than on November 1. The daily rate of production of coke and anthracite pig iron by months for the past year was as follows:

Daily Rate of Pig Iron Production by Months in 1908.—*Gross Tons.*

	Steel works.	Merchant.	Total.
January	21,432	12,286	33,718
February	25,717	11,446	37,163
March	27,145	12,474	39,619
April	24,185	14,104	38,289
May	24,505	13,098	37,603
June	23,923	12,521	36,444
July	25,762	13,525	39,287
August	28,952	14,899	43,851
September	31,117	16,183	47,300
October	32,217	18,337	50,554
November	32,705	19,890	52,595
December	35,172	20,986	56,158

Pig Iron Production in 1908.

The statistics for December make possible an estimate of the total pig iron production for 1908. Statistics of charcoal iron production in the second half have not yet been ascertained, but it is known that the Lake Superior carcoal furnaces which contributed 80 per cent. of the output in the first half produced only about half as much is the second half as in the first six months. It is probable, therefore, that as against 129,720 tons in the first half the total of charcoal iron in the second half was not more than 70,000 to 75,000 tons. The figures below for six months periods in the past four years are those of the American Iron and Steel Association, except for the last half of 1908:

Gross tons.	1905.	1906.	1907.	1908.
First half.....	11,163,175	12,582,250	13,478,044	6,918,004
Second half...	11,829,205	12,724,941	12,303,317	*8,955,000
Totals ...	22,992,380	25,307,191	25,781,361	*15,873,004

* Estimated.

December Product by Districts.

The table below gives the production of coke and anthracite furnaces in December and the four months preceding:

Monthly Pig Iron Production.—Gross Tons.

	August. (31 days)	September. (30 days)	October. (31 days)	November. (30 days)	December. (31 days)
New York....	83,004	108,453	120,191	123,640	138,445
New Jersey...	16,866	16,544	17,036	16,273	18,680
Lehigh Valley.	36,701	42,184	41,775	45,763	52,172
Schuylkill Val.	24,586	23,918	47,210	51,397	47,237
Lower Susquehanna and Lebanon Val.	23,632	24,170	31,304	32,800	38,190
Pittsburgh Dis.	362,417	359,132	387,207	398,314	410,887
Shenango Val.	91,534	93,372	103,393	92,187	103,549
West. Penn...	73,207	72,633	97,052	89,094	102,020
Md., Va. and Kentucky....	47,492	50,150	51,691	51,110	53,369
Wheeling Dis..	24,368	23,409	27,273	24,593	39,317
Mahoning Val.	103,021	102,606	113,533	123,122	152,599
Central and North. Ohio.	117,016	119,163	118,620	113,281	132,590
Hocking Valley, Hanging Rock and S. W. Ohio	19,909	22,376	23,151	29,660	41,626
Mich.,Minn.,Mo., Wis., Colo...	35,542	39,408	43,673	57,952	63,839
Chicago Dist.	156,537	167,896	171,732	159,395	169,085
Alabama	122,840	126,137	138,929	139,013	148,611
Tennessee, Georgia and Texas	21,159	27,447	33,428	30,260	28,696
Totals....	1,359,831	1,418,998	1,567,198	1,577,854	1,740,912

Among furnaces blown in in December were Detroit (Wayne), Musconetcong in New Jersey, one Brooke in the Schuylkill Valley, one Isabella (January 1) and one Donora in the Pittsburgh District, Robesonia in the Lebanon Valley, Watts in Kentucky, two Mingo Junction in the Wheeling District, Upson at Cleveland, Bessie in the Hocking Valley, Wellston in the Hanging Rock region and two Gary in Indiana. Rebecca and Marshall in western Pennsylvania have blown in since January 1.

The list of furnaces going out in December includes one Shenango in the Shenango Valley, one Haselton in the Mahoning Valley, Warner in Tennessee and one Monongahela at McKeesport, Pa. (banked).

Production of Steel Companies.

Returns from all plants of the United States Steel Corporation the Cambria, Pennsylvania, Maryland, Lackawanna, Wheeling, Republic, Youngstown Sheet & Tube, Jones & Laughlin, La Belle, Bethlehem, Calumet, Inland, Colorado and Tennessee (Ensley) companies show the following totals of product month by month. We give separately a statement of the output of spiegeleisen and ferromanganese, which is included for each month in the total production:

Production of Steel Companies.—Gross Tons.

	Pig.—Total production.—			Spiegeleisen and ferromanganese.	
	1906.	1907.	1908.	1907.	1908.
January	1,358,015	1,406,397	664,415	21,477	20,254
February	1,226,760	1,317,923	745,802	19,444	9,402
March	1,400,395	1,424,827	841,502	31,091	13,750
April	1,333,591	1,446,788	725,548	26,527	12,263
May	1,372,423	1,470,080	759,674	28,822	17,823
June	1,293,437	1,457,230	717,689	30,942	15,958
July	1,323,391	1,452,557	798,639	25,343	10,250
August	1,237,485	1,445,685	897,052	23,696	14,932
September	1,264,380	1,417,153	933,514	30,270	8,938
October	1,452,200	1,514,521	996,481	35,105	12,174
November	1,411,350	1,084,114	981,167	21,861	15,882
December	1,445,528	659,459	1,090,339	19,480	6,510

Capacity in Blast January 1 and December 1.

In the following table is given the weekly capacity of coke and anthracite furnaces in blast January 1 and December 1, based largely on their performance in the preceding month in each case:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	January 1.— Number in blast.	Capacity per week.	December 1.— Number in blast.	Capacity per week.
New York:					
Buffalo	15	12	27,384	12	26,395
Other New York.	7	3	3,870	3	3,816
New Jersey.....	8	3	4,595	2	4,297
Spiegel	2	0	0	0	0
Pennsylvania:					
Lehigh Valley...	25	10	11,081	10	11,892
Spiegel	3	2	705	2	558
Schuylkill Valley.	15	8	12,118	7	12,039
Low. Susquehanna	7	3	4,690	3	4,710
Spiegel	1	0	0	0	0
Lebanon Valley..	10	5	4,790	4	3,986
Pittsburgh Dist..	45	32	92,125	31	89,650
Spiegel	3	2	2,170	2	1,810
Shenango Valley.	20	10	21,511	11	21,687
W. Pennsylvania.	27	15	23,485	15	21,571
Maryland	4	2	3,584	2	3,937
Wheeling District..	14	5	10,050	3	6,251
Ohio:					
Mahoning Valley.	20	13	31,612	14	32,492
Central and North. and Michigan..	22	14	33,344	12	29,851
Hocking Valley, Hang. Rock and S. W. Ohio....	15	11	9,680	9	8,463
Illinois and Indiana	26	17	42,448	14	35,844
Spiegel	2	0	0	1	1,347
Minnesota and Wisconsin	7	4	5,556	4	5,197
Missouri & Colorado	7	4	6,875	4	7,118
The South:					
Virginia	23	10	6,750	10	6,927
Kentucky	5	2	2,010	1	1,044
Alabama	46	23	33,677	23	32,438
Tennessee	18	9	6,409	10	7,292
Georgia & Texas.	3	1	375	1	490
Totals	400	220	400,894	210	381,102

A Record of Active Capacity.

The active weekly capacity in coke and anthracite iron has shown the following fluctuations since January 1, 1904:

	Capacity per week.		Capacity per week.
January 1, 1909	400,894	June 1	472,622
December 1, 1908	381,102	May 1	484,031
November 1	362,685	April 1	484,240
October 1	337,925	March 1	479,737
September 1	313,112	February 1	482,156
August 1	284,590	January 1, 1906	463,673
July 1	264,452	December 1, 1905	475,814
June 1	259,284	November 1	460,449
May 1	268,674	October 1	445,468
April 1	264,890	September 1	412,563
March 1	267,437	August 1	410,088
February 1	241,925	July 1	408,617
January 1, 1908	235,152	June 1	443,092
December 1, 1907	347,372	May 1	452,031
November 1	491,436	April 1	439,564
October 1	511,397	March 1	403,157
September 1	507,768	February 1	405,792
August 1	513,471	January 1, 1905	377,879
July 1	528,170	December 1, 1904	357,846
June 1	523,220	November 1	334,249
May 1	524,538	October 1	319,249
April 1	496,456	September 1	291,573
March 1	511,035	August 1	246,092
February 1	492,359	July 1	272,301
January 1, 1907	507,397	June 1	336,107
December 1, 1906	513,860	May 1	368,244
November 1	500,580	April 1	337,257
October 1	469,665	March 1	308,751
September 1	441,426	February 1	273 692
August 1	449 908	January 1, 1904	185,636
July 1	460,577		

The Iron and Metal Trades

Pig Iron Production Increasing Rather Rapidly.

The Steel Trade Very Quiet.

The monthly Pig Iron statistics collected by *The Iron Age* indicate a tendency toward increased output which may give rise to some misgivings. On the first of the year there were in operation 220 Coke and Anthracite blast furnaces whose weekly productive capacity figured up to 400,894 tons, or at the rate of 20,800,000 tons for the year. On the first of December 210 furnaces were blowing with a capacity of 381,000 tons per week. Among the new producers are the two Gary stacks, whose make, of course, does not immediately go into consumption. Still, the expansion in output does not appear to harmonize well with the reports of the development of activity in the finishing industries. If it were possible to collect statistics of the stocks of Pig Iron at the furnaces, we would have a better means of judging whether optimism has got the better of the Iron makers, and whether they are not in danger of overdoing the resumption to normal.

How much progress has been made since the midsummer dullness is admirably reflected in the following little table, which gives the actual daily production of Pig Iron in June, in November and in December, separating Steel works and Merchant furnaces:

1908.—*Daily Rate of Pig Iron Production.—Gross Tons.*

	Steel works furnaces.	Merchant furnaces.	Total.
June	23,923	12,521	36,444
November	32,705	19,890	52,595
December	35,172	20,986	56,158

The Merchant furnaces have gained rather more rapidly than the Steel works' stacks.

Although it is only fair to state that the new year is not yet fairly launched, still the feeling is gaining ground that new business in Finished Iron and Steel is not coming up to expectations, moderate though they were. The railroad orders particularly are lagging, and in other channels of consumption there is a lack of snap.

The Reading order of 15,000 tons of Rails has not been followed by any others of note, and the amount of car work is after all moderate. Orders for railroad bridge work are scarce, and the Structural trade is relying largely upon a multitude of small jobs all over the country. In this respect, however, the outlook is quite encouraging.

There has been some revival of the talk of cutting of prices, but there have not been recently any happenings which indicate that there has been any change in the situation which has obtained for many months.

Quite a number of fair sized lots of Cast Iron Pipe have been contracted for lately and other municipal requirements are coming up. San Francisco is expected to call for a total of about 40,000 tons, and Salt Lake City will place quite an attractive tonnage.

In the struggle between the dealers in Old Material and the mills, the latest developments seem to favor the latter slightly and in some leading markets the tone is a little weaker.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 6, 1909.	Dec. 30, 1908.	Dec. 2, 1908.	Jan. 1, 1908.
PIG IRON, Per Gross Ton:				
Foundry No. 2, Standard, Philadelphia	$17.25	$17.25	$17.25	$18.00
Foundry No. 2, Southern, Cincinnati	16.25	16.25	16.25	16.25
Foundry No. 2, Local, Chicago	17.00	17.00	17.00	18.50
Basic, delivered Eastern Pa.	**16.75**	16.75	16.50	16.50
Basic, Valley Furnace	15.50	15.75	15.50	17.50
Bessemer, Pittsburgh	17.40	17.40	17.40	19.40
Gray Forge, Pittsburgh	**15.40**	15.40	15.15	17.65
Lake Superior Charcoal, Chicago	19.50	19.50	19.50	23.50
BILLETS, &c., Per Gross Ton:				
Steel Billets, Pittsburgh	25.00	25.00	25.00	28.00
Forging Billets, Pittsburgh	27.00	27.00	27.00	30.00
Open Hearth Billets, Phila	26.20	26.20	26.20	30.00
Wire Rods, Pittsburgh	33.00	33.00	33.00	34.00
Steel Rails, Heavy, at mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
Steel Rails, Melting, Chicago	*14.50*	15.00	15.50	12.00
Steel Rails, Melting, Phila	**17.50**	17.50	16.25	11.50
Iron Rails, Chicago	19.50	19.50	19.50	15.00
Iron Rails, Philadelphia	**21.25**	21.25	20.50	17.50
Car Wheels, Chicago	16.00	16.00	16.00	20.00
Car Wheels, Philadelphia	16.00	16.00	16.00	19.00
Heavy Steel Scrap, Pittsburgh	**16.75**	17.00	16.50	12 50
Heavy Steel Scrap, Chicago	*14.00*	14.50	15.25	10.75
Heavy Steel Scrap, Phila	**17.50**	17.50	16.25	11.50
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined Iron Bars, Philadelphia	**1.52**	1.52	1.50	1.75
Common Iron Bars, Chicago	1.50	1.50	1.50	1.75
Common Iron Bars, Pittsburgh	1.50	1.50	1.50	1.60
Steel Bars, Tidewater, New York	1.56	1.56	1.56	1.76
Steel Bars, Pittsburgh	1.40	1.40	1.40	1.60
Tank Plates, Tidewater, New York	1.76	1.76	1.76	1.86
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.70
Beams, Tidewater, New York	1.76	1.76	1.76	1.86
Beams, Pittsburgh	1.60	1.60	1.60	1.70
Angles, Tidewater, New York	1.76	1.76	1.76	1.86
Angles, Pittsburgh	1.60	1.60	1.60	1.70
Skelp, Grooved Steel, Pittsburgh	1.45	1.45	1.45	1.70
Skelp, Sheared Steel, Pittsburgh	1.50	1.50	1.50	1.80
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, Black, No. 28, Pittsburgh	2.50	2.50	2.50	2.60
Wire Nails, Pittsburgh	1.95	1.95	1.95	2.05
Cut Nails, Pittsburgh	1.75	1.75	1.75	2.00
Barb Wire, Galv., Pittsburgh	2.40	2.40	2.40	2.50
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake Copper, New York	**14.75**	14.75	14.50	13.62½
Electrolytic Copper, New York	14.25	14.25	14.25	13.50
Spelter, New York	5.20	5.15	5.20	4.20
Spelter, St. Louis	5.05	5.00	5.05	4.05
Lead, New York	*4.20*	4.15	4.35	3.75
Lead, St. Louis	*4.10*	4.00	4.20	3.60
Tin, New York	28.85	28.85	29.40	27.25
Antimony, Hallett, New York	8.12½	8.12½	8.12½	8.50
Nickel, New York	45.00	45.00	45.00	45.00
Tin Plate, 100 lb., New York	$3.89	$3.89	$3.89	$4.09

Chicago.

FISHER BUILDING, January 6, 1909.—(*By Telegraph.*)

Just emerging from the lethargy of the holidays, the business of the new year cannot be said as yet to have been fairly launched. Measured by the amount of new business now coming up, there is nothing to boast of at present in the Iron and Steel market, but if gauged prospectively in accordance with the existing hopeful sentiment respecting the outcome, a more encouraging view is presented. How soon the tide of improvement will set in and how rapidly it will rise are questions to which no satisfactory answer is found in present developments. The delay of the railroads in placing orders for their 1909 Rail requirements is a source of disappointment to all interests. At the South Works of the Illinois Steel Company, the No. 1 Rail mill rolling Heavy Sections was shut down a week ago, and is still idle. All other finishing departments at these works are in operation, including the Light Rail mill and 21 Open Hearth furnaces. Specification against Steel Bar, Structural Material and Axle Billet contracts are being furnished in fair volume, but little new business of any kind has been entered in the past two weeks. Two contracts for Cast Iron Pipe, aggregating 7200 tons, were awarded last week, and lettings on about 3000 tons, comprising the requirements of Duluth and Minneapolis, are scheduled for this week. Among the few inquiries out for fabricated material, promising early closure, are the 8000 tons for the Northern Pacific, 500 tons for the Chicago, Milwaukee & St. Paul, and 4600 tons for the Vendome Building. Lack of demand from consumers and the unwillingness of dealers to add to their already large

holding of Scrap have had a weakening effect on Old Material. The fact that prices have not receded further than current quotations indicate is due mainly to the small amount of material coming into the market. Pig Iron continues inactive, although prices are unaffected.

(By Mail.)

Pig Iron.—The transition from the old to the new year was unaccompanied by developments of special significance or interest in the Pig Iron market. In the brief spurt of buying that followed the November elections, consumers seem to have pretty well covered their prospective requirements for the first quarter at least, not a few having bought at that time for the entire first half. Just how nearly the rate of consumption is in accord with the estimates of melters for forward shipment cannot be accurately gauged, but some deliveries on last half contracts are being carried over; the aggregate of these, however, is believed to be unimportant, both as to size and the interests involved. Beyond a few transactions in lots ranging from carloads up to 100 tons, there is nothing doing in the market. One agency reports sales for last week amounting to 600 tons, another 400 tons and none has inquiries under consideration for any considerable quantity. The fact that consumers are holding aloof and manifest no present interest has seemingly not affected the position of producers respecting prices. The Southern furnaces, without exception, are holding unyieldingly at $13, Birmingham, for No. 2 Foundry for first quarter. With one or two exceptions this price is only applied to deliveries extending through the first quarter, which means that the furnaces asking above $13 for the latter shipments are practically out of the market on second quarter business. Northern Iron is controlled by like conditions, a differential of 50c. a ton being asked for second quarter deliveries, and in consequence the few purchases being made are limited to first quarter. Quotations have been made on 8000 tons of Basic, for which a local interest is reported to be in the market; but, according to the best information obtainable, the order has not been placed. In fact, it is questioned whether the inquiry was backed by a serious purpose to buy at anything short of an attractive concession from the present market level. The following quotations are for January, February and March delivery, f.o.b. Chicago:

Lake Superior Charcoal	$19.50 to $20.00
Northern Coke Foundry, No. 1	17.50 to 18.00
Northern Coke Foundry, No. 2	17.00 to 17.50
Northern Coke Foundry, No. 3	16.50 to 17.00
Northern Scotch, No. 1	18.00 to 18.50
Southern Coke, No. 1	17.85 to 18.35
Southern Coke, No. 2	17.35 to 17.85
Southern Coke, No. 3	16.85 to 17.35
Southern Coke, No. 4	16.35 to 16.85
Southern Coke, No. 1 Soft	17.85 to 18.35
Southern Coke, No. 2 Soft	17.35 to 17.85
Southern Gray Forge	15.85 to 16.35
Southern Mottled	15.60 to 16.10
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	17.90 to 18.40
Jackson Co. and Kentucky Silvery, 6 %	19.90 to 20.40
Jackson Co. and Kentucky Silvery, 8 %	20.90 to 21.40
Jackson Co. and Kentucky Silvery, 10 %	22.90 to 23.40

Billets and Rods.—Market activity does not extend beyond the placing of small contracts for Forging Billets. Notwithstanding the moderate demand, prices are reported to be firmly maintained at $28.50, base, Chicago. While specifications of Wire Rods are reasonably plentiful, buyers are at present giving little attention to forward requirements. We continue former quotations.

Rails and Track Supplies.—The fact that railroads are still evincing no interest in their Rail requirements for the coming year is distinctly disappointing, not only to the mills but also to a large number of allied industries, which are anxiously awaiting the placing of these contracts in the hope that it will mark the beginning of a widening demand from this source. Save for a fair run of specifications, which on Spikes and Bolts are better than in most lines, the week has been extremely quiet. The December Light Rail business entered by the Illinois Steel Company was rather better than was expected, amounting to 6000 tons. Prices on Light Rails, though not subject to the extreme variations noted some months ago, are still shaded $1 to $1.50 a ton in competition with rerolling sections. Quotations are unchanged.

Structural Material.—The new year begins with most of the fabricating shops well filled with work, but very quiet as respects the development of new business. No contracts of important size were included in the scattering closures of last week. The Chicago, Milwaukee & St. Paul Railroad has an inquiry out for 500 tons, on which bids go in early this week, and it is expected that the 8000 tons for the Northern Pacific, under consideration for some time, will likely be closed within a few days. Bids will be submitted this week on 560 tons of Structural Material required for J. B. Clow & Sons' new plant at Coshocton, Ohio. Several small lots have been negotiated in the West, among which were 300 tons for a powerhouse for the Great Western Power Company, Oakland, Cal., taken by the American Bridge Company; an aggregate of 540 tons for three building struuctures, taken by Dyer Brothers, San Francisco, and 345 tons for the L. E. Kelly Building, Oakland, Cal., which was secured by the Ralston Iron Works. Plans for the Vendome Building, Chicago, requiring 4600 tons, are now being figured, and bids will be submitted at an early date. Competition is still very keen among fabricators, and dissatisfaction is felt at the low level to which prices have been forced. The Structural mill at the South Works has been running steadily for some time on specifications, but little has been added in the meantime to stocks of Plain Material, which are now considerably reduced. Quotations are unchanged.

Plates.—Although new Plate orders are light and not over plentiful, both the Sheared and Universal mills at the South Works are running at a moderate gait on specifications against contracts, the bulk of them being for car construction and structural work. Some are also coming from the jobbers against stock orders, but the volume of such business is comparatively small. Some shading of prices on mill shipments is still being done, but the situation in this respect is not different from what it has been for several weeks. Such concessions, it is reported, do not as a rule exceed $1 a ton. Quotations are unchanged.

Sheets.—Business has fallen off considerably in the last 10 days, both in mill and stock shipments. Some slowing up, however, was expected at this time, and it is, therefore, regarded as largely incident to the season. It is too soon after the turn of the year to expect a decisive movement as the result of getting down to business again. In fact, the general feeling seems to be that whatever improvement comes will be gradual in its growth, and without sensational developments. Prices hold fairly even, and the new year begins with promising steadiness of values. Quotations are unchanged.

Bars.—As compared with the same week a year ago, the situation shows definite improvement. Manufacturers are specifying freely against contracts for Steel Bars, and the Bay View mills of the Illinois Steel Company are running practically full. The Sylvan mill of the Republic Steel & Iron Company, at Moline, is supplied with orders from the local implement manufacturers to keep it going most of the time. The Bar Iron mills are not so fully employed, but are running intermittently about as they have been doing for some time. Prices quoted last week are reported as being firmly maintained on both Steel and Iron Bars.

Merchant Pipe.—Business has not recovered from the inactivity of the past two weeks, during which time but little new business has been entered. The jobbing interests express themselves as satisfied with the outlook for the coming year, believing that by February 1 trade will open up and gradually expand into a satisfactory volume. Owing to the differential of $\frac{1}{10}$c. per 100 lb. between all rail and lake and rail shipments, in favor of the latter, jobbers in the Northwest are not likely to come in the market for stock supplies until the opening of navigation. Stocks, it is believed, are generally below the normal, and this will probably lead to heavier buying as soon as the demand from consumers begins to show improvement. Quotations are unchanged.

Boiler Tubes.—The market is lifeless so far as the demand for Merchant Tubes is concerned, there being no buying either from mills or from stock, save in small lots to supply current needs. A few fair sized orders for Locomotive Tubes have been booked as a result of necessary repair work, but the movement in this line is by no means satisfactory. Former quotations are continued.

Merchant Steel.—Now that the retarding influences of stock taking and the temporary let-up of work in factories occasioned by the holidays have passed, a better demand is looked for. A large part of the requirements, both of manufacturing and jobbing trade, are covered by contracts, against which specifications are being offered in fair volume. Quotations are unchanged.

Cast Iron Pipe.—The 5700 tons let last week by the city of Chicago was awarded to the United States Cast Iron Pipe & Foundry Company, the specifications calling for small Pipe. It is reported that the 1500 tons for which the city of Indianapolis was in the market was secured by the Lynchburg Foundry Company. Bids will be opened by the city of Duluth January 7 for 1200 to 1500 tons, and by the city of Minneapolis about the same time for 1700 tons. The pronounced scarcity of off grade Iron and the general firmness of Pig Iron prices are responsible for a firmer tendency in Cast Iron Pipe, but it has not resulted in a definite stiffening of prices. We quote nominally per ton, Chicago, as follows: Water Pipe, 4 in., $27; 6 to 12 in., $26; 16 in. and up, $25, with $1 extra for Gas Pipe.

Metals.—Several fair sized lots of Copper, for which inquiries came into the market just prior to the close of the year, have been bought this week. The reported advances on Ingot Copper in foreign markets have had the effect of hastening the closure of some hesitating business, although prices in the local market are unchanged. Prospects of tariff changes affecting Lead have had an unsettling influence upon this Metal, which is slightly weaker. Old Materials are quiet, but exhibit a little firmer tone. Quotations are unchanged.

Old Material.—As against the uniform optimism dis-

played a few weeks ago by all dealers in the continued ascendency of Old Material values, there is this week less unanimity of feeling in this respect. In face of the fact that only one list of railroad material, amounting to some 3000 tons, has been offered in the last two weeks, the bidding for it was decidedly tame. It is evident that consumers have no pressing requirements and are buying only when tempting prices are offered. More and more difficulty is experienced by dealers in disposing of transit stock, and rather than add incoming shipments to their already well crowded yards they are frequently obliged to accept a loss in order to effect prompt disposition of material on track. Prices realized on recent sales of Railroad Scrap ranged lower than those of previous weeks. No. 1 Railroad Wrought brought $14.25, Rerolling Steel Rails $16.35, and Frogs, Switches and Guards, $14.50. Transactions, however, have been too small and infrequent to furnish a positive line on the list throughout, but it is evident that the market is weaker and is not strongly supported by dealers, who are cautious about making commitments involving future deliveries on a basis of present values. An aggregate of about 6800 tons is comprised in three lists to be offered this week, which are as follows: Chicago, Rock Island & Pacific, 1200 tons; Santa Fe, 2600 tons, and the Chicago, Milwaukee & St. Paul, 3000 tons, the latter including 1000 tons of Rerolling Steel Rails. It is reported that the Great Northern has just issued a list including 10,600 tons, of which 5000 tons is Old Iron Rails, 700 tons Malleable and 600 tons No. 1 Cast. The following prices are per gross ton, f.o.b. Chicago:

Old Iron Rails	$19.50 to $20.00
Old Steel Rails, rerolling	16.00 to 16.50
Old Steel Rails, less than 3 ft.	14.50 to 15.00
Relaying Rails, standard sections, subject to inspection	22.50 to 23.50
Old Car Wheels	16.00 to 16.50
Heavy Melting Steel Scrap	14.00 to 14.50
Frogs, Switches and Guards, cut apart	14.00 to 14.50
Mixed Steel	12.00 to 12.50

The following quotations are per net ton:

Iron Fish Plates	$16.75 to $17.25
Iron Car Axles	20.50 to 21.00
Steel Car Axles	18.50 to 19.00
No. 1 Railroad Wrought	14.00 to 14.50
No. 2 Railroad Wrought	13.00 to 13.50
Springs, Knuckles and Couplers	13.75 to 14.25
Locomotive Tires, smooth	14.75 to 15.25
No. 1 Dealers' Forge	11.00 to 11.50
Mixed Busheling	9.00 to 9.50
Iron Axle Turnings	9.00 to 9.50
Soft Steel Axle Turnings	9.00 to 9.50
Machine Shop Turnings	9.00 to 9.50
Cast Borings	7.25 to 7.75
Mixed Borings, &c.	7.25 to 7.75
No. 1 Mill	9.00 to 9.50
No. 2 Mill	8.00 to 8.50
No. 1 Boilers, cut to Sheets and Rings	10.50 to 11.00
No. 1 Cast Scrap	13.50 to 14.00
Stove Plate and Light Cast Scrap	12.00 to 12.50
Railroad Malleable	13.25 to 13.75
Agricultural Malleable	11.50 to 12.00
Pipes and Flues	11.00 to 11.50

Birmingham.

BIRMINGHAM, ALA., January 4, 1909.

Pig Iron.—As was anticipated, shipments deferred for the annual inventory have in practically all cases been ordered forward, and the synopsis of market conditions since the result of the past year's operations is known is considerably more encouraging. The business so far transacted in the new year is of little significance comparatively, carload lots for prompt shipment having been principally in demand, but inquiries from all lines of foundry trades are for larger proportions than involved in previous negotiations with apparently no incentive for speculation. The attitude of producers is unchanged. A conservative course as to additional commitments is generally being followed; especially is this true of the low grades. Quotations on a basis of $13, Birmingham, for No. 2 Foundry are firm for spot shipments and deliveries during the first quarter with an advance of 50c. per ton over that basis being asked for strictly second quarter shipments. No sales are reported at the latter figures, and notwithstanding bona fide inquiries, quotations have not been elicited on deliveries further advanced than the first half. The tonnage to be resold causes some apprehension among producing interests, and a number of instances are reported where that portion of last quarter engagements at lower prices than now prevail remaining unshipped was not carried over. There has been no increase in the rate of production. Three additional furnaces are ready for operation, and it is understood that the unsatisfactory supply of raw material and fuel accounts for the delay in blowing in, rather than stock accumulations. In this connection, one furnace has been banked since January 1 from a shortage of Coke. The local melt is soon to be increased by the operation of an entirely new foundry, while a contract has been placed for the construction of equipment to double the capacity of another.

Cast Iron Pipe.—The city of Salt Lake, Utah, is soon to place an order for an attractive tonnage of Water Pipe and a number of small lettings by Southwestern points are coming up within the next 30 days. A significant tonnage is also expected from the East and South by reason of recent bond issues. There has been no change in quotations, but owing to the condition of order books, largest concerns quote on deliveries some months advanced with some reluctance. In the case of a local interest no figures are named on shipments to be made at a later date than April 1. By the end of the week it is expected that the output in this district will be normal. We quote Water Pipe as follows, per net ton, f.o.b. cars here: 4 in. to 6 in., $25; 8 in. to 12 in., $24; over 12 in., average, $23, with $1 per ton extra for Gas Pipe. These quotations are probably shaded on large municipal contracts.

Old Material.—As is the case in other markets, the outlook is brighter. It is currently rumored that idle local mills are soon to be put in operation and inquiries from other territories indicate a larger consumption. The only transaction of moment among late reports was the purchase of some 250 tons of Light Cast by a local dealer. We quote dealers' asking prices as follows, which have a tendency to advance:

Old Iron Rails	$15.00 to $15.50
Old Iron Axles	16.00 to 17.00
Old Steel Axles	13.50 to 14.00
No. 1 Railroad Wrought	14.00 to 14.50
No. 2 Railroad Wrought	11.00 to 11.50
No. 1 Country Wrought	11.00 to 11.50
No. 2 Country Wrought	9.50 to 10.00
No. 1 Machinery	11.50 to 12.00
No. 1 Steel	10.50 to 11.00
Stove Plate and Light Cast	9.50 to 10.00
Cast Borings	5.00 to 5.50
Standard Car Wheels	13.50 to 14.00
Tram Car Wheels	12.00 to 12.50

Philadelphia.

PHILADELPHIA, PA., January 5, 1909.

Transactions have been on a very small scale. The regular routine of business has been interrupted by the holidays and matters pertaining to the closing of the year. Many plants which have been shut down to facilitate inventory work and overhauling are gradually resuming, but it will take several weeks before the trade gets back to the usual routine. The situation in the various lines is decidedly strong, and the trade is preparing for a prosperous year. While it is expected that the early development will be slow, optimistic views are expressed regarding general conditions. The railroads show a disposition to become more active buyers. The Philadelphia & Reading Railroad has placed an order with the Pennsylvania Steel Company for 15,000 tons of Standard Rails for early delivery, this order being 50 per cent. greater than that placed by the same road last year. Several of the other roads in this territory are preparing plans for more active work.

Pig Iron.—Current business has been along narrow lines. Consumers have not yet come into the market since the turn of the year, and it will probably be several weeks before any real activity develops. Few new inquiries of importance have come out, although there is the usual run of small business for early shipment. The tone of the market is strong, and sellers continue to exert but little effort to transact business, particularly for extended delivery. Buyers are reported to be taking deliveries freely, and in some instances urging prompt shipment of Iron bought for further extended delivery. The week's sales have been confined almost entirely to Foundry grades, the bulk of the business has been done at prices around $17.50, delivered, for No. 2 X, although some little Iron was sold at $17.25, delivered, and moderate lots are still to be had at the latter figure. One sale aggregating 3000 tons of central Pennsylvania Iron, the majority of which was No. 2 X, was sold for delivery in that territory during the entire year, at a price slightly above $17.50, delivered, for No. 2 X, which would represent an advance of full 50c. over the top price quoted for that grade delivered in this territory. Southern Iron has been quiet, practically no business being reported at current prices, which are firm at $13 to $13.50, Birmingham, for No. 2 Foundry. Sales of Virginia Foundry Iron have been small, but at full prices. There has been little fresh inquiry for Forge Iron. Some business which has been pending is still unclosed. The Pipe foundries are still in the market for round lots of low grade Irons, and while some small business has been done they are not yet willing to meet sellers' ideas of prices for large lots. A large tonnage of Basic Iron is pending, but no actual business has been done in this grade. Low Phosphorus Iron is comparatively quiet, but one sale, a lot of 500 tons of 0.035 iron, being reported at a price equal to about $21.50, delivered. Prices show but little change; sellers are firm on prompt Iron, and still refuse to quote for forward shipment. For delivery during the first quarter, in buyers' yards, eastern Pennsylvania and nearby territory, quotations range as follows:

Eastern Pennsylvania, No. 2 X Foundry	$17.25 to $17.50
Eastern Pennsylvania, No. 2 Plain	16.75 to 17.00
Virginia, No. 2 X Foundry	17.25 to 17.75
Virginia, No. 2 Plain	17.00 to 17.25
Gray Forge	16.00 to 16.50
Basic	16.75 to 17.00
Low Phosphorus	21.50 to 21.75

Ferromanganese.—Several sales of carload lots have been made, but there is little forward business pending. For prompt shipment $44 to $45, Baltimore, about represents the market, with $45 to $46, seaboard, named for delivery during the first half.

Plates.—Business has been irregular. At times orders have been numerous, and at others the demand has been very light. This is attributed largely to the holidays and a resumption of business is hardly looked for until along about the middle of the month. Prices are unchanged.

Billets.—Business continues light, with orders almost entirely for prompt deliveries. Quotations are firm, but show no change, $26.20 being named for Ordinary Rolling Steel, with Forging Steel $28.20, subject to the usual extras for high carbons and special sizes.

Structural Material.—While the demand continues moderate, there is a likelihood of an increase for building purposes in the near future, several moderate sized office buildings being under consideration. Current business, however, continues of a miscellaneous character. Prices continue firm, 1.75c. to 1.90c., according to specifications, being quoted for delivery in this territory.

Sheets.—A number of mills have resumed operations, after suspension for the holidays, repairs and inventories. The demand continues light, and mills have little forward business on their books, sales being almost entirely for prompt shipment. Prices are unchanged.

Bars.—Many mills still remain idle since the holiday suspension, and some will no doubt await an accumulation of orders before starting. Business develops slowly, and is closely confined to small lots. Prices are firm, Refined Iron Bars being quoted at 1.52c. to 1.60c., delivered, with Steel Bars 1.55c., delivered.

Coke.—There has been no business of importance. The probability of increased furnace capacity in the near future, however, is expected to develop more activity in Furnace Coke. Foundry Coke is in light demand. Prices, while firm, show no change.

Old Material.—Business has been practically at a standstill. Some good tonnages of Heavy Melting Steel are under consideration, but buyers and sellers are still wide apart on their ideas regarding prices. Melters have been able to pick up odd lots at prices ranging around $17, delivered, but dealers will pay 50c. above that price. A large share of the floating Scrap is being picked up by dealers and shipped on account of the recent heavy sale to a large Plate interest. The monthly railroad lists are now coming out, some offering pretty heavy quantities of Scrap, and the market will likely remain somewhat inactive until these have been disposed of. In the absence of sales of importance quotations for delivery in buyers' yards, eastern Pennsylvania and nearby territory, are nominally as follows:

No. 1 Steel Scrap and Crops	$17.50 to $18.00
Low Phosphorus	20.00 to 21.00
Old Steel Axles	22.50 to 23.00
Old Iron Axles	24.25 to 24.75
Old Iron Rails	21.25 to 21.75
Old Car Wheels	16.00 to 17.00
Choice No. 1 R. R. Wrought	20.00 to 20.50
Machinery Cast	16.00 to 16.50
Railroad Malleable	15.75 to 16.25
Wrought Iron Pipe	15.25 to 15.75
No. 1 Forge Fire Scrap	15.00 to 15.50
No. 2 Light Iron	10.00 to 10.50
Wrought Turnings	14.00 to 14.50
Stove Plate	13.75 to 14.25
Cast Borings	13.00 to 13.50
Grate Bars	14.50 to 15.00

San Francisco.

SAN FRANCISCO, December 30, 1908.

The position of the Iron and Steel trades on the Pacific Coast appears somewhat more favorable than for many months. While there has been no active movement in December, many inquiries are being received in most lines and more are expected immediately after the turn of the year. It is not anticipated that the market will resume a normal condition at once, but the operation of Coast industries on a larger scale, and the prospect of several large development projects being carried out in the near future, give assurance of increasing activity in the earlier months of the year. The outlook is especially good in the North, where the condition of the lumber trade has shown marked improvement, and considerable marine work is also being started at the Northern ports. Several large railroad projects for the interior of California have been under consideration for a long time, but up to the present have been held back by lack of capital. At least one, however, is now under way, and others are likely to be in the market for supplies before the end of next summer. Some large contracts for Cast Iron Pipe are anticipated within the next month, including a large tonnage for the auxiliary water system for San Francisco. The large contract for pumps and turbines for the city work, which was held up at last report, has been awarded to the Byron Jackson Iron Works of this city, for $179,000, which is $6000 in excess of the bid submitted by an Eastern house. There has been an active demand for Wire Nails on the Coast for some time, and deliveries on orders are rapidly coming forward.

Structural Material.—Few contracts for Structural Steel work have been awarded in the latter part of December, and the month as a whole brought somewhat less activity than was anticipated, in view of the large number of plans that had been under consideration. Owners of property, as a rule, are not in a position to build large structures unless tenants are secured in advance, which has thus far resulted in many buildings being held back. There is a lively inquiry, however, for business space to be occupied at the end of next summer, and to meet this demand a large amount of work is anticipated for the next two or three months. There is no prospect of an immediate change of the character of the work, the present tendency being to erect buildings which individually require only a small tonnage. The majority of the small work in San Francisco is being done by local fabricators, most of whom are still keeping fairly busy on former contracts. The movement of finished Structural Material from the East is accordingly of no great proportions. The local fabricators are still working at rather low prices. Some of them are securing small amounts of Structural Shapes from importers, who are selling at from $5 to $7 below the prices of the Eastern material, but no large tonnage of foreign Steel is arriving at present. The importers are carrying no stock on hand, as this was shown by the experience after the fire to be an unsafe speculation, but any decrease in the tariff would undoubtedly cause a considerable increase of importation on the Pacific Coast. The American Bridge Company has taken over from the Ralston Iron Works a contract for furnishing 500 tons for the Claus Spreckels Building. A proposition has been made by a number of local real estate men to build a new city hall for San Francisco at a cost of $5,000,000, to be paid for by the city on long terms, but no definite action has been taken on the matter. Plans are announced for a 12-story, class A hotel building at the corner of Fourth and Jessie streets, and it is stated that contracts are to be let within the next month. Contracts are to be closed within two months for a four-story Steel frame building at the corner of Kearny and Sutter streets. The Judson Mfg. Company has taken a small contract for Structural Steel and Iron work for a theatre building on Broadway, near Stockton street. Another block of San Francisco municipal bonds is to be offered for sale in February, to include $400,000 for the foundation and Steel frame for the City and County Hospital, and $660,000 to be devoted to the new Hall of Justice, which will probably cover the entire cost. The demand for Structural and Ornamental Cast Iron continues to increase, and while most of the contracts are comparatively small, the local manufacturers have a very fair amount of business on hand.

Rails and Track Supplies.—Numerous inquiries have come in from various parts of the Coast for both Rails and Track Supplies. Several large orders for miscellaneous supplies have been placed from the Northern Coast railroads, and the electric lines of southern California are in the market for small amounts. The promoters of a 35-mile line connecting Fresno and Hanford, Cal., are in the market for about 5000 tons of Rails. Inquiries altogether amount to several hundred thousand tons, a considerable proportion of which will probably be closed within a few months. Representatives of several central California traction projects are making efforts to secure the necessary capital to begin work in 1909, and it is possible that some of them may require supplies during the spring. The United Railroads of San Francisco expects to lay something over 10 miles of new Rails during the year. The Ocean Shore Railway still has about 30 miles of track to complete, the material for which will be secured as rapidly as possible. An increased inquiry for Light Rails for logging roads is expected from the north Coast next spring, but at the present time the movement of Light Rails, either for logging or mining developments, is confined to narrow limits.

Pig Iron.—No new quotations on Pig Iron have been established since last report, and trading is practically at a standstill. This condition may be partly attributed to the holiday season, as the local melters are taking their annual inventories, and are inclined to postpone purchases until after the first of the year. No material change has taken place in the general situation, however, and sellers do not anticipate any activity during the winter months. Though the foundry business has shown more life for the last two months, no large supplies are needed, and buyers are still disposed to confine their purchases to the smallest possible limits. Very little foreign Pig Iron is coming to hand, but the importers are carrying more than is desirable, and there is a continual pressure to sell. In the absence of new business, no definite quotations are given.

Cast Iron Pipe.—Several contracts for Cast Iron Pipe have been let by California municipalities during the month, and a fair amount of similar business will probably be closed early in the year, but none of these transactions involves very large amounts. The interest of the trade is now cen-

tered on the requirements of San Francisco for the auxiliary water system. It is announced that the entire amount, comprising about 40,000 tons, will be contracted for at once, and the award is to be made about the end of January. The People's Water Company of Oakland has promised to lay a number of new mains and install fire hydrants in the city of Alameda in the near future. Yuba City, Cal., has awarded contracts to the United States Cast Iron Pipe & Foundry Company for 5265 ft. of 8-in. and 4543 ft of 6-in. pipe at $32.28 per net ton, and 9078 ft. of 4-in. at $33.28. The San Bernardino contract, comprising 2760 ft. of 4-in. and 2040 ft. of 6-in., has also been awarded to the same company. The Board of Public Works of San Diego, Cal., has asked for authority to purchase 6000 ft. of 10-in. Pipe for improvements to the service of the towns of La Jolla and Pacific Beach. The town of Bisbee, Ariz., has sold bonds for water works, amounting to $125,000.

Merchant Pipe.—The market has been of a holiday character. The jobbing business is in a rather stronger condition than for some months, as the majority of dealers are holding out for firm prices, but the demand is limited. The town of Ventura, Cal., has awarded a contract for 10,500 ft. of 3-in. Black Pipe to P. Charlebois for $2515. The Yuba City contract for Wrought Pipe was awarded to the Pacific Coast Supply Company. The outlook for business in the California oil fields early in the year is not encouraging, but a slightly increased buying movement on the part of the jobbers is anticipated.

The Bostonia Fruit Growers' & Packers' Company is preparing to lay 18,000 ft. of riveted Steel Pile on its ranch near El Cajon, Cal.

The contract for three tiers of Steel cells for the Sacramento County Jail has been let to the Stewart Jail Company for $41,340.

R. D. Hawley, Pacific Coast sales agent for the Railroad Supply Company, will return from the East immediately after the first of the year.

A contract for an $800,000 Steel steamship for the Matson Navigation Company is now pending. If the deal is closed, the work will probably go either to the Pennsylvania Steel Company or to the Union Iron Works.

Plans are being made at the Puget Sound Navy Yard for a foundry building to cost $175,000, consolidating the foundries of all departments. The building will cover 90 x 300 ft.

The port of Portland, Ore., is planning three Steel tugs for the towage service between Portland and the ocean. The estimated cost is about $325,000.

Pittsburgh.

PARK BUILDING, January 6, 1909.—(*By Telegraph.*)

Pig Iron.—The market continues very quiet. While there is some inquiry for Basic and Bessemer for first quarter and first half delivery, little is being bought. A local consumer who came in the market a week or 10 days ago for 3000 to 4000 tons of Basic was quoted as low as $15.50, Valley furnace, by several companies, but did not buy, deciding to hold off until the Iron is actually needed. A local interest reports a sale of 5000 tons of Basic of special analysis as regards Manganese, for use in making car wheels, at $16, Valley furnace. We quote Standard Bessemer for first half delivery at $16.50; Malleable Bessemer, $15.75 to $16; Basic, $15.50 to $15.75; No. 2 Foundry, $15.50, and Gray Forge, $14.50, all at Valley furnace, with a 90-cent freight rate to Pittsburgh.

Steel.—Few new orders for Billets and Sheet and Tin Bars are being placed, but shipments of the Steel mills in December against contracts were heavier than in any other month last year. It is stated that regular prices on Billets and Bars are being maintained. We quote Bessemer and Open Hearth Billets, 3⅞ in. and larger, up to and including 0.25 carbon, $25; 0.26 to 0.60 carbon, $1 extra; over 0.60 carbon, $2 extra, all f.o.b. Pittsburgh. For Wheeling, Martin's Ferry, Follansbee, Newcastle, Sharon, Steubenville and Washington (Pa.) delivery, half the freight, or 50c. additional, is charged. Sheet and Tin Bars in random lengths are $27.50, f.o.b. Pittsburgh. Forging Billets take $2 advance over Rolling Billets.

(*By Mail.*)

While the general feeling is optimistic, there is little tangible in the way of new orders to warrant it. Of course it is a little early in the year to expect a rush of orders, but nevertheless the amount of new business is disappointing. However, underlying conditions are good, and it is believed that in a short time heavy orders for Rails and equipment will be placed by the railroads. If the railroads commence to buy conditions may be expected to improve, but the feeling is growing that the tariff agitation is hurting trade, consumers holding back orders until they know something definite as to how much the duties will be reduced. Pig Iron is quiet. A new ruling by the railroads regarding shipments of Coke has somewhat demoralized the Coke market, and the attitude of consumers of Scrap in refusing to buy has caused a slight weakness in this material.

Ferromanganese.—While inquiries and actual sales are light, the market is firm, and we quote 80 per cent. foreign Ferro at about $44.50, seaboard, for first quarter delivery, the freight rate to Pittsburgh being $1.95 a ton.

Ferrosilicon.—There is not much inquiry, and we quote 50 per cent. at $63 to $63.25, Pittsburgh, for first quarter delivery.

Wire Rods.—Actual sales of Rods in the past two or three weeks have been light, but there is some inquiry, and it is believed that contracts for round lots will be placed during this month. The market is firm, on the basis of $33 for Bessemer and $33 for Chain Rods, Pittsburgh.

Muck Bar.—No new contracts for Muck Bar have been placed in this market for several weeks. The Kittanning Iron & Steel Mfg. Company will start up its Muck Bar mill January 11, and is said to have its output pretty well sold up for the next three months. We quote best grades of Muck Bar, made from all Pig Iron, at $28, Pittsburgh.

Skelp.—We note a continued active demand for Grooved and Sheared Iron Plates on which prices are very firm, but there is not much inquiry for Steel Skelp. Quotations are unchanged.

Steel Rails.—The Carnegie Steel Company has taken an order for 1000 tons of 100-lb. Open Hearth Rails for the Chesapeake & Ohio Railroad. It is now filling an order for 10,000 tons of Open Hearth Standard Sections for export, which are being rolled at the Edgar Thomson Works. This plant has no Open Hearth furnaces, the cold ingots being taken from the Homestead Works. Last week was the best week in Light Rails that the company has had in more than a year, it having taken orders and received specifications against contracts for over 3000 tons. As yet the expected orders from the large railroads have not materialized. Quotations are unchanged.

Plates.—The 10-year contract of the Pressed Steel Car Company, by which it secured practically its entire supply of Plates from the Carnegie Steel Company, will expire February 14, it is said, and negotiations for its renewal have been under way for some time. The general demand for Plates is fair and is slowly getting better. The Carnegie Steel Company is rolling a large tonnage of Plates for the National Tube Company, while the Jones & Laughlin Steel Company is rolling the Plates for a large Ore boat, and has other fairly large contracts. The La Belle Iron Works, Steubenville, reports more Plate orders, and the Allegheny Steel Company also reports an increase in new orders. The market is fairly strong, although several of the mills are still shading prices on the narrow sizes from $1 to $2 a ton. Regular prices are unchanged.

Structural Material.—While a good deal of large work is in sight, it is very slow to close. The American Bridge Company has taken about 1000 tons for the new foundry of the Crane-Best Company, at Verona, Pa., the other 1000 tons going to the Riter-Conley Mfg. Company, of this city. The Triumph Electric Company, Cincinnati, has placed about 860 tons with the Interstate Engineering Company. Bids have gone in on the Kenyon Theater on the N. S., Pittsburgh, Pa., about 300 tons. Reports are that large work continues to be placed at extremely low prices, practically shutting out from competition fabricating concerns who have to buy Steel from the mills and pay official prices for it. Quotations are unchanged.

Sheets.—Several of the leading Sheet mills advise us that bookings in the past two or three weeks have been fair, and that the demand is slowly increasing. The American Sheet & Tin Plate Company is operating this week 61 per cent. of its Sheet mill capacity, with most of the outside mills running at about the same rate. A few of the Sheet mills continue to shade prices slightly, not over $1 to $2 a ton, but the general market is fairly strong. Quotations are unchanged from last week.

Tin Plate.—A fair amount of new business is being placed, while specifications against contracts of the canning interests and salmon packers closed in November and December are coming in quite freely. Prices on Tin Plate are quite firm, and are only occasionally shaded to a slight extent by a few of the smaller outside mills.

Iron and Steel Bars.—Several large inquiries from railroads for Iron Bars are in the market, but the specifications and deliveries wanted, some through the whole of this year, are not satisfactory to the mills, and they are not eager to put this business on their books. The Scrap trade is maintaining prices on a high level, causing an increased cost in making Iron Bars, and the mills are indifferent about booking too far ahead. New business, both in orders and in specifications against contracts, has been light for the past two or three weeks, but improvement is looked for this month. We quote Iron Bars at 1.42c., Pittsburgh, for Western shipment, or 1.60c., Chicago, and for delivery in the Pittsburgh District, 1.50c. Iron Bars rolled from strictly Muck Bar stock, such as Zug, Lockhart and others, are held at about 1.90c., at mill. Steel Bars are firm, at 1.40c., Pittsburgh, for base sizes.

Hoops and Bands.—Practically no contracts have yet been made on these products for this year's delivery, but it is expected that within a couple of weeks some heavy orders will be placed for delivery over the whole 12 months. It is probable that present prices will be reaffirmed for this year's delivery.

Railroad Spikes.—As yet very little is doing in this product, expected orders from some of the leading railroads not having come out. The demand for the small sizes is fairly active, but the actual orders placed with the mills for Railroad Spikes for 1908 were only about 25 to 30 per cent. as large as in 1907. Quotations are unchanged.

Merchant Steel.—It is expected that specifications against contracts of consumers will be heavier this month than in December. New orders are light and only for current needs. There is a fair demand for Shafting, but the large consumers are covered by contracts, against which they are specifying at a fairly satisfactory rate. Quotations are unchanged.

Spelter.—The demand is quiet, but prices are fairly firm, and we quote prime grades of Western at 4.95c., East St. Louis, equal to 5.07½c., Pittsburgh.

Merchant Pipe.—The general demand for merchant sizes of Pipe continues fairly active, and it is believed that this month will show a material increase over December. No new contracts for line Pipe have been placed since our last report, but some large projects involving heavy tonnage are under way, some of which may be closed at any time. We are advised that recently quoted prices on both Iron and Steel Pipe are being absolutely maintained by the mills.

Boiler Tubes.—This trade continues extremely dull, only a few small orders being placed for actual needs. Prices are more or less shaded, and the whole Tube market is in very unsatisfactory condition.

Iron and Steel Scrap.—Heavy consumers have been keeping out of the market for the past two or three weeks, refusing to pay the high prices asked by dealers, with the result that there is more anxiety on the part of the latter to effect sales, and naturally more disposition to make concessions in prices. The embargo on Scrap routed for the Allegheny Steel Company has been lifted and it is again taking in material. Most leading consumers have pretty large stocks on hand. We have slightly reduced prices on several lines and now quote, per gross ton, as follows: Heavy Steel Scrap for Pittsburgh, Monessen, Brackenridge, Sharon, Leechburg or Steubenville delivery, $16.75 to $17; Cast Iron Borings, $11.50; Bundled Sheet Scrap, $14.75 to $15; No. 1 Busheling Scrap, $14.50 to $14.75; No. 2, $10.50 to $10.75; Iron Axles, $24 to $24.50; No. 1 Cast Scrap, $15; Sheet Bar Crop Ends, $20.75 to $21; Rerolling Rails, $17.75 to $18, delivered, Cambridge, Ohio, or $18.25, delivered, Cumberland, Md.; Steel Axles, $19.25 to $19.50; Low Phosphorus Melting Stock, 0.04 and under in Phosphorus, $18.50; Machine Shop Turnings, $13 to $13.25; Grate Bars, $13 to $13.25; Railroad Malleable Scrap, $15.50 to $15.75; Railroad Wrought Scrap, $16.75 to $17; Locomotive Tires, $17.25 to $17.50; Iron Rails, $18.50 to $18.75. All prices are f.o.b., Pittsburgh, unless noted otherwise. We note sales of about 1500 tons of Heavy Steel Scrap at about $17, delivered; 1500 tons of Cast Iron Borings at $11.50, delivered, and about 2500 tons of Machine Shop Turnings at $13 to $13.25, delivered.

Coke.—Prior to January 1 the railroads allowed the Coke makers to ship Coke to railroad scales in the Coke regions where it was stored in cars until destination was found for it. On the date named the railroads announced that this would no longer be allowed, with the result that very heavy stocks of Coke on cars will have to be moved on short notice, and this has brought about much lower prices on both Furnace and Foundry Coke for prompt shipment. Connellsville Furnace Coke for spot delivery has sold at $1.50 per net ton, at oven, or lower, and 72-hr. Foundry at $2 or lower. As soon as shipping directions can be given for this stock Coke, and it has been shipped out, prices will improve, as the present condition is only temporary. Standard Connellsville Furnace Coke on contracts for first half is held at $1.90 to $2, and 72-hr. Foundry at $2.25 to $2.40, at oven. It is believed that too many ovens are going in view of the light demand for Coke, and the heavy stocks in the regions. The output of Coke last week was 207,853 tons, a reduction over the previous week of nearly 40,000 tons.

The National Tariff Convention will be held at Indianapolis February 16 to 18, instead of February 9 to 11, as at first proposed. This was decided upon January 2 at a meeting in Indianapolis attended by James W. Van Cleave, president of the National Association of Manufacturers; H. E. Miles of Racine, Wis.; John Kirby, Jr., of Dayton, Ohio; D. M. Parry and others.

Marshall Furnace of the Juniata Furnace & Foundry Company, Newport, Pa., was blown in January 2.

St. Louis.

ST. LOUIS, January 4, 1909.

The outlook for building operations for the year is encouraging. The city of St. Louis contemplates the expenditure of $6,466,500 for public buildings and the bridge to East St. Louis, and many private enterprises in the line of office buildings, mercantile and factory structures, together with residences, flats and apartment houses will be begun early in the spring. It is announced that the Franklin Realty Company, David May, president, will erect a 10-story Steel frame building at the corner of Morgan and Sixth streets.

Coke.—The market for Coke has ruled very quiet. The little business doing has been confined to carlots; neither is there much inquiry. For immediate shipment there is a disposition to shade prices a little. We quote for prompt shipment: 72-hr. Foundry, $2.10, at oven, Connellsville; for shipment over first half, $2.25 to $2.65.

Pig Iron.—With one exception, the leading sales agents report a quiet week in Pig Iron, transactions being confined to orders covering a few cars each for prompt or early January shipment. The De Camp Bros. & Yule Iron, Coal & Coke Company reports the sale of 3000 tons Missouri Basic, the buyer being a local industry. The contract calls for delivery over the first quarter. Fairly good specifications on contracts are being received from some buyers, with requests for holding shipment on the part of others. A renewal of the demand for Pig Iron is confidently looked for and a moderate inquiry is already in hand. We quote Southern No. 2 Foundry, Birmingham, as follows: Immediate shipment and first quarter, $13; first half, $13.25; second quarter, $13.50; Ohio Iron, $15.50 and $16, for No. 2 at Ironton; Northern Silvery, 8 per cent. Silicon, $18.50 to $19, at Jackson County furnaces.

Finished Iron and Steel.—There is very little inquiry at present for Structural Steel. Bars are in fair demand, principally from implement and wagon manufacturers. For Standard Rails there is small inquiry, but the demand for Light Rails has been surprisingly good; in fact the leading interest states that sales for December exceeded those of any other month of 1908. Track Supplies of all kinds continue in good demand.

Old Material.—While very little business has been passing, there is an undercurrent of strength to the market occasioned by two circumstances; first, the probable increase of demand from local consumers after the turn of the year; and second, the fact that Scrap Iron is ruling in the East at relatively higher figures, almost sufficient to admit of shipments from here at a margin of profit, especially Steel and rolling mill products. Stocks are moderate here, probably not exceeding 50,000 tons in dealers' hands. There are no offerings posted by the railroads. Relaying Rails continue in good demand. Price changes unimportant. Quotations per gross ton are as follows:

Old Iron Rails	$17.00 to $17.50
Old Steel Rails, rerolling	14.75 to 15.00
Old Steel Rails, less than 3 ft	14.25 to 14.75
Relaying Rails, standard sections, subject to inspection	24.00 to 24.50
Old Car Wheels	16.50 to 17.00
Heavy Melting Steel Scrap	14.75 to 15.25
Frogs, Switches and Guards, cut apart	14.75 to 15.25
Mixed Steel	10.25 to 10.75

The following quotations are per net ton:

Iron Fish Plates	$16.00 to $16.50
Iron Car Axles	20.00 to 20.50
No. 1 Railroad Wrought	14.50 to 15.00
No. 2 Railroad Wrought	13.50 to 14.00
Railway Springs	13.00 to 13.50
Locomotive Tires, smooth	13.50 to 14.00
No. 1 Dealers' Forge	11.50 to 12.00
Mixed Borings	7.00 to 7.50
No. 1 Boilers cut to Sheets and Rings	10.00 to 10.50
No. 1 Cast Scrap	13.50 to 14.00
Stove Plate and Light Cast Scrap	10.50 to 11.00
Railroad Malleable	12.00 to 12.50
Agricultural Malleable	10.50 to 11.00
Pipes and Flues	10.50 to 11.00
Railroad Sheet Scrap	11.50 to 12.00
Railroad Grate Bars	11.50 to 12.00
Machine Shop Turnings	9.50 to 10.00

Lead, Spelter, Etc.—Pig Lead is much stronger at 4.10c. bid, to 4.15c. asked, with a good demand from brokers and consumers. Lead Ore is firm at $25 per 1000 lb., Joplin basis. Spelter is quiet, with a fair demand from galvanizing interests, but the Brass trade is dull, though indications are favorable for an improvement the coming week. We quote for galvanizing 5.10c. to 5.15c. East St. Louis. Zinc Ore is held at $40 per ton, Joplin basis.

The St. Louis Car Company has filed a deed of trust for $2,500,000, covering all of its real estate and personal property. The company is capitalized at $3,000,000 and has $1,000,000 of bonds outstanding. These bonds will be taken up and $2,500,000 new bonds will be issued. This will give the company $1,500,000 new funds.

The Euston Lead Company, which has just been incorporated with a capital stock, fully paid, of $100,000, will begin at once the erection of a plant in Mill Creek Valley, St.

Louis, which when completed will cost over $100,000. The first building will be a three-story structure, 140 x 200 ft., built of brick, with slate roof, and following this several other buildings will be put up.

The Steel plant of the National Enameling & Stamping Company at Granite City, Ill., is now running to full capacity.

The Helmbacher Rolling Mills at Madison, will largely increase their force of employees February 1.

Cincinnati.

CINCINNATI, OHIO, January 6, 1909.—(*By Telegraph.*)

New Year sentiment is strongly optimistic in this market, particularly in the finished machinery lines. The first week has seen some very good orders placed for the standard tools, and the manufacturers of small, portable, electrically driven tools have been especially favored. The Pig Iron sales agencies are all doing some business. Some are enlarging their organizations, and rumors of one or two newcomers in the field are heard. The year promises to be particularly notable in the tool manufacturing lines, for the number and variety of new devices and improvements in the redesigning of standard types and the entirely new tools to be brought out, work on which progressed rapidly during last year's depression. The jobbing foundry melt is increasing slowly.

Pig Iron.—There have been quite a number of sales of spot Iron during the week, ranging from carloads to 200-ton lots. The Pipe companies are all out for Iron, representing a big tonnage in the aggregate, and some Indiana, Kentucky and Ohio melters have bought for delivery during the first half since the close of the year. Selling agents do not anticipate much activity until the last month or so of the second quarter, and the opinion seems to be general that there will be no increase in price during the first six months. Low grades are still scarce, and the prices quoted are firmer relatively than the higher grades of Foundry Iron. A sale of the week was 500 tons Mottled and the same amount of Forge at $11.50 and $12, Birmingham, respectively. A sale of Malleable, 1000 tons, for delivery over the first half, brought $15.75 at a southern Ohio furnace. A sale of analysis Iron for delivery to a large Indiana manufacturer of windmills and agricultural machinery, 1000 tons, second and third quarter, is credited to a local selling agency. Some good sized recent sales have been made through this market for delivery in Louisville territory. Reports here indicate that all Southern furnaces operated successfully through the holiday season this year, and made considerably more Iron than usual. Sarah Furnace blew out the last week of the year for relining and repairs. Nothing of any special note seems to be transpiring in southern Ohio, but ere the month is out some announcements of reorganizations, changes of control and the like are expected. Selling agents report a lessening of inquiries for second half Iron. Ohio Silveries are still quotable at $18.50, at furnace, for 8 per cent., with a 50c. differential between grades under 10 per cent. and $1 above that mark. For first half delivery, based on freight rates of $3.25 from Birmingham and $1.10 from the Hanging Rock District, we quote, delivered, Cincinnati, as follows:

Southern Coke, No. 1	$16.75 to $17.25
Southern Coke, No. 2	16.25 to 16.75
Southern Coke, No. 3	15.75 to 16.25
Southern Coke, No. 4	15.25 to 15.75
Southern Coke, No. 1 Soft	16.75 to 17.25
Southern Coke, No. 2 Soft	16.25 to 16.75
Southern Coke, Gray Forge	14.75 to 15.25
Southern Mottled	14.50 to 15.00
Ohio Silvery, 8 per cent. Silicon	19.60 to 20.10
Lake Superior Coke, No. 1	17.10 to 17.60
Lake Superior Coke, No. 2	16.60 to 17.10
Lake Superior Coke, No. 3	16.10 to 16.60
Standard Southern Car Wheel	22.25 to 23.25
Lake Superior Car Wheel	21.75 to 22.75

(*By Mail.*)

Coke.—The market is very quiet and prices are unchanged. Alabama Coke operations during the holiday season furnished a surprise. Many large furnace interests bought an extra supply of Coke, mostly from the Virginia ovens, anticipating the usual erratic conduct of the negro help at their own ovens during this period. Instead, the employees were steadier than for many years and worked on through the season save Christmas and New York's Day and the intervening Sundays. Furnace companies had the same pleasant experience. The improvement is attributable in large measure to the change which placed the State in the prohibition column. Spot Furnace grades are obtainable as low as $1.65, at oven, and Foundry brands, which are a little stronger, at about $2, at oven. Contracting is being done on a basis of $2.15 to $2.50, at oven, for Foundry Coke.

Finished Iron and Steel.—Trade is quiet with dealers and jobbers, but contractors for Structural work of various kinds are busy with inquiries, and there are some good sized jobs in preliminary stages on drawing boards for location in the Central West. These are scarcely expected to culminate before March 1. Mills in this district are running full on Sheets, and showing confidence in the future, are stocking up steadily for what is expected to be a big season. Little new business worth mention is coming out in Iron Bars, and prices are being maintained. Considerable interest is manifest among local machine tool builders in the announcement of the Cincinnati Steel Foundry Company that it will manufacture Crucible Steel Castings which have hitherto been obtained from the East. Quotations are unchanged.

Old Material.—The Scrap markets are lifeless. Prices have weakened a little all along the line. Melting Steel, which made a strong close, has steadily declined in the new year, and large consumers are confident that they can buy as low as $14, f.o.b. Cincinnati, with dealers quoting $14.50 to $15. No. 1 Railroad Wrought is quiet at $14 to $14.50, net ton. Dealers are not even trading with each other to any extent, and it looks as though prices may recede further during January at least. As near as it can be gauged under the exceedingly light buying and inquiry the market is about as follows, f.o.b. Cincinnati:

No. 1 R. R. Wrought, net ton	$14.00 to $15.00
Cast Borings, net ton	6.50 to 7.50
Heavy Melting Steel Scrap, gross ton	14.00 to 15.00
Steel Turnings, net ton	6.00 to 7.00
No. 1 Cast Scrap, net ton	12.50 to 13.00
Burnt Cast, net ton	9.00 to 10.00
Old Iron Axles, net ton	16.75 to 17.75
Old Iron Rails, gross ton	15.00 to 16.00
Old Steel Rails, short, gross ton	13.00 to 14.00
Old Steel Rails, long, gross ton	13.00 to 14.00
Relaying Rails, 56 lb. and up, gross ton	21.50 to 22.50
Old Car Wheels, gross ton	15.50 to 16.50
Low Phosphorus Scrap, gross ton	14.00 to 15.00

Cleveland.

CLEVELAND, OHIO, January 5, 1909.

Iron Ore.—Information obtained by a merchant Ore interest indicates that the stocks of Ore in independent furnace yards are considerably smaller than at this time a year ago. In 1907, with business activity at high pitch and a record breaking Ore movement of over 42,000,000 tons, large quantities were shipped to the furnace yards before the slump came in October, and with a sudden decrease in blast furnace operations, and the consumption of Ore many furnace interests had enough Ore in their yards to last them nearly through the past year. As a result, a large share of the Ore on the docks at the close of navigation in 1907 was not moved during the past year. Furnace interests followed a conservative policy in buying Ore during 1908, resulting in the heavy decrease in the lake shipments, and the stocks in many of the furnace yards have therefore been reduced considerably as compared with the amount on hand a year ago. While Ore is moving slowly from the docks shipments have improved somewhat. One merchant Ore firm reports the receipt of fairly good shipping orders. With the Pig Iron market as inactive as it is at present, Ore sellers do not expect consumers soon to become interested in Ore for the coming season, and a buying movement is not expected before March 1 at the earliest. Ore prices at Lake Erie docks, per gross ton, are as follows: Old Range Bessemer, $4.50; Mesaba Bessemer, $4.25; Old Range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—The only sales reported the past week are a few small lots of Foundry Iron, the largest being only 300 tons. A Northern Ohio consumer is in the market for 1000 tons of No. 2 Foundry for the first half delivery, but this is the only inquiry pending, with the exception of two or three for small lots. In spite of the absence of further buying, furnace interests regard the situation as quite satisfactory for the reason that they are shipping out all of their Iron as fast as made, and there being no requests to furnaces to withhold shipments. Prices remain stationary and firm. For the first quarter and first half we quote, delivered Cleveland, as follows:

Bessemer	$17.40
Northern Foundry, No. 1	$16.90 to 17.40
Northern Foundry, No. 2	16.50 to 16.90
Northern Foundry, No. 3	16.00 to 16.50
Gray Forge	15.25 to 15.50
Southern Foundry, No. 2	17.35 to 17.85
Jackson County Silvery, 8 per cent. Silicon	20.05

Coke.—Consumers seem to be well covered for the first half, and prices on Coke for spot shipment are rather weak. We quote Standard Connellsville Furnace Coke for the first half at $1.90 to $2, at oven, and $1.75 to $1.85 for spot shipment. Connellsville 72-hr. Foundry Coke is held at $2.35 to $2.50, at oven, for the first half and $2.25 for spot shipment.

Finished Iron and Steel.—The leading interest reports a fairly good run of specifications considering the holiday season, but orders on contract received by other mill sales managers have been very light. The largest new contract closed was for 250 tons of Plates and Shapes for a small boat. The Structural situation shows a little improvement, some new work having come up that will soon require small quantities. It is expected that the contract will be let before the end of the present month for the new Brotherhood of Locomotive Engineers' Building in this city, which will require about 2500 tons of Structural Material. While fabricators are still quoting low prices on Structural work,

prices seem to be somewhat higher than they were a few months ago. Specifications are largely for Steel Bars. The demand for Iron Bars shows no improvement, but prices are now being firmly maintained. The two local Bar Iron mills started up January 4 after a shutdown during the holidays, but they have only a limited tonnage on their books. Good Steel Bar specifications were received during the week from a local rivet manufacturer. The demand for Plates is light, although some small orders are beginning to come from consumers who had sent in no specifications for nearly three months. Plate prices are still being shaded from $1 to $2 a ton, mostly on the narrow sizes. Some Sheet specifications are coming in, but the demand is rather light. Prices are not being firmly maintained. Jobbers are feeling the effect of the holiday and inventory season, both their mill and warehouse business being light. The only orders that are coming from railroads for track supplies are for very small lots.

Old Material.—With an almost total absence of demand, the market shows a weaker tone. Dealers, however, appear confident that strength will develop as soon as the demand picks up, and seem content to wait developments. Little improvement is looked for until the latter part of the month. One local mill has placed an embargo on Scrap, and others are taking but little on contract. Railroad offerings this week include lists from the Erie, Pennsylvania and Big Four, the lists from the latter two roads being smaller than usual. Dealers' prices to the trade, per gross ton, f.o.b. Cleveland, are as follows:

Old Steel Rails	$16.50 to $17.00
Old Iron Rails	19.00 to 19.50
Steel Car Axles	20.50 to 21.00
Old Car Wheels	16.00 to 16.50
Heavy Melting Steel	15.25 to 15.75
Relaying Rails, 50 lb. and over	22.00 to 23.00
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	13.50 to 14.00
Light Bundled Sheet Scrap	9.50 to 10.00

The following prices are per net ton, f.o.b. Cleveland:

Iron Car Axles	$20.00 to $20.50
Cast Borings	8.50 to 9.00
Iron and Steel Turnings and Drillings	10.00 to 10.50
Steel Axle Turnings	11.00 to 11.50
No. 1 Busheling	13.00 to 13.50
No. 1 Railroad Wrought	15.50 to 16.00
No. 1 Cast	14.00 to 14.50
Stove Plate	12.00 to 12.50
Bundled Tin Scrap	9.00

Buffalo.

BUFFALO, January 5, 1909.

Pig Iron.—Extreme quiet is the characteristic feature of the market for the week, and it is likely to remain in this condition until the end of the inventory period. Inquiries are few and in some instances specifications on contracts have been suspended temporarily, pending the closing of inventories. Prices are unchanged, as follows, f.o.b. Buffalo:

No. 1 X Foundry	$16.50 to $17.00
No. 2 X Foundry	16.00 to 16.50
No. 2 Plain	15.50 to 16.00
No. 3 Foundry	15.50 to 16.00
Gray Forge	15.50 to 15.75
Basic	16.00 to 16.50
Malleable Bessemer	17.00 to 17.50
Charcoal	20.75 to 21.25

Old Material.—The market is still in a state of absolute dullness, with little trading of any nature. Prices are practically unchanged and largely nominal, as follows, per gross ton, f.o.b. Buffalo:

Heavy Melting Steel Scrap	$15.25 to $15.75
Low Phosphorus Steel Scrap	21.00 to 21.50
No. 1 Railroad Wrought	16.25 to 16.75
No. 1 Railroad and Machinery Cast Scrap	15.00 to 15.50
Old Steel Axles	18.50 to 19.50
Old Iron Axles	22.00 to 22.75
Old Car Wheels	16.00 to 16.75
Railroad Malleable	14.00 to 14.50
Boiler Plate	12.50 to 13.00
Locomotive Grate Bars	12.25 to 12.75
Pipe	12.25 to 12.75
Wrought Iron and Soft Steel Turnings	9.50 to 10.00
Clean Cast Iron Borings	9.00 to 9.50
No. 1 Busheling Scrap	14.75 to 15.00

Finished Iron and Steel.—The new year has as yet brought no noticeable improvement in inquiries or orders, either in railroad materials, Bars or Shapes, but there is an underlying feeling of confidence that the lull will soon be succeeded by a period of increasing activity. In Structural lines indications of increased business are already apparent. The Lackawanna Steel Company has been given the order for the Structural Steel—between 900 and 1000 tons—required for the new flouring mill for the Washburn-Crosby Company in this city, work upon which has been begun by James Stewart & Co., Chicago, the general contractors, who will this week receive bids for the erection of the Steel work. The Lackawanna Steel Company will also furnish the Structural Steel for the Masonic Temple, to be erected at Indianapolis. Bids for the new 11-story Onondaga Hotel, at Syracuse, requiring about 1500 tons of Steel, will probably be called for the latter part of January.

Metal Market.

NEW YORK, January 6, 1909.

Pig Tin.—The statistics as compiled by C. Mayer indicate stocks in the United States of 3185 tons December 31. This is an increase of 350 tons, as compared with the end of November. The total visible supplies throughout the world were 19,928 tons, which, although 50 tons less than the month previous, are abnormally large, being 7870 tons larger than at the end of December, 1907. Business during the week has been light. Price changes were unimportant, as follows: December 30, 28.95c.; December 31, 29.15c.; January 4, 29.12½c.; January 5, 28.95c.; January 6, 28.85c. The London market closes to-day at £131 for spot and £132 5s. for futures. The arrivals are 1527 tons, and the afloats 1690 tons.

Copper.—Prices are steady, and prompt Electrolytic is obtainable at 14.25c. to 14.37½c., net cash, f.o.b. New York. Lake is held by producers at 14.75c. Some inquiries for forward shipments have been made, but the views of buyers and sellers are too far apart to result in any orders. In Europe the demand is fair. The estimated production by the Government of about 410,000 gross tons caused no surprise among the larger trade. The London market closes to-day at £63 15s. for spot and £64 10s. for futures.

Pig Lead.—The market is stronger. In St. Louis, Lead has been sold at 4.10c. This corresponds to 4.25c., New York, although the American Smelting & Refining Company continues to quote shipment Lead, in 50-ton lots, at 4.20c.

Spelter.—Prices are firmer, Prime Western Brands being quoted at 5.05c., St. Louis, and 5.20c., New York. Some holders are asking 5.25c. for choice brands.

Antimony.—Prices are unchanged, at 8.12½c. to 8.25c. for Hallett's; 8.37½c. to 8.50c. for Cookson's, and 8c. for outside brands.

Tin Plate.—Prices continue firm, at $3.70, Pittsburgh, and $3.89, New York, for 100-lb. IC Coke Plates.

Old Metals.—Business has been brisk, and the market broader. Price changes are unimportant, save for Lead, where there has been a decline of 5c. per 100 lb. Otherwise, dealers' selling prices are unchanged from last week.

Iron and Industrial Stocks.

NEW YORK, January 6, 1909.

The stock market of the past week has been under conflicting influences, mainly downward. United States Steel stocks have been under pressure, which is ascribed to liquidation by some stockholders, in view of the approaching tariff revision, while other industrial stocks, especially equipment stocks, have advanced on account of additional improvement in railroad business. The decision of the United States Supreme Court on Monday, upholding the action of the State of New York in reducing to 80 cents per 1000 ft. the price charged by the Consolidated Gas Company of New York, was a decided surprise, as it unexpectedly reversed the decision of the lower court, and it chilled the efforts which were being made to advance general stock values. The range of prices on leading iron and industrial stocks from Thursday of last week to Monday of this week was as follows:

Allis-Chalm., com.	15¼- 15⅝	Pressed St., com...	42 - 43⅜
Allis-Chalm., pref..	49⅜- 50	Pressed St., pref...	101½-102
Beth. Steel, com...	23½- 24½	Railway Spr., com.	47½- 48¾
Beth. Steel, pref.....	50	Railway Spr., pref.	102¼-102½
Can, com.....	9 - 9½	Republic, com.....	25¼- 25¾
Can, pref.....	73 - 73¾	Republic, pref.....	85¼- 86½
Car & Fdry, com...	49 - 50¼	Sloss, com.....	76½
Car & Fdry, pref..	109 -110	Pipe, com.....	28⅜- 29½
Steel Foundries...	39 - 39¼	Steel, com.....	52¼- 54½
Colorado Fuel.....	38¾- 41⅜	Steel, pref.....	112¾-113½
General Electric...	155 -159	West. Electric....	83⅜- 86½
Gr. N. ore cert....	72⅜- 73¾	Chi. Pneu. Tool...	26½- 27½
Int. Harv., com....	64½- 66	Amer. Ship, com.....	57¼
Int. Harv., pref....	109½-110	Cambria Steel.....	39 - 39¾
Locomotive, com...	56 - 57⅜	L. S. Corp.....	15½- 16⅝
Locomotive, pref...	113 -114	Penn. Steel, pref..	103½-104½
Nat. En. & St.,com.	14½- 14¾	Crucible Steel, com.....	8
Nat. En. & St.,pref.....	85	Crucible Steel, pref.	57¼- 57½

Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 52, preferred 113, bonds 102¼; Car & Foundry common 48⅞, preferred 110⅝; Locomotive common 56¾, preferred 112; Colorado Fuel 40½; Pressed Steel common 43, preferred 101¾; Railway Spring common 47¼; Republic common 25⅛, preferred 86¼; Sloss-Sheffield common 76¼; Cast Iron Pipe common 28, preferred 74; Can common 9, preferred 72.

Dividends.—The E. W. Bliss Company has declared a quarterly dividend of 2½ per cent. on the common stock and 2 per cent. on the preferred stock.

The November production of pig iron in Germany was 930,738 metric tons, as compared with 1,112,225 tons in November, 1907. For the 11 months ending November 30 the totals were 10,796,985 tons this year and 11,940,393 tons last year.

New York.

NEW YORK, January 6, 1909.

Pig Iron.—During the week a leading boiler making plant has purchased several thousand tons of a varied assortment of Foundry Irons, and a Pipe founder took round blocks for delivery to a number of different plants. Melters are taking deliveries promptly, and in some cases are anticipating, so that apparently consumption is slightly above expectations. We quote $17.25 to $17.50 for No. 1 Northern Foundry, $17 to $17.50 for No. 2 Foundry and $16.50 to $16.75 for No. 2 Plain, at tidewater. Alabama Irons are quoted $17.50 to $17.75 for No. 1 Foundry, and $17.25 to $17.50 for No. 2 Foundry.

Steel Rails.—The Reading Railroad order for 15,000 tons placed with the Pennsylvania Steel Company last week is for Bessemer Rails, all of which will be rolled at Sparrow's Point in January and February. From Pittsburgh 2000 tons of scattering orders are reported. Of the large business pending, heretofore referred to, some is expected to be placed in the next two weeks.

Structural Material.—The amount of new work coming up in building lines is the encouraging feature of the situation, railroad business continuing meager, and with no indication of immediate betterment. The American Bridge Company's orders in December amounted to 30,500 tons, and other fabricating companies are estimated to have taken 70,000 to 75,000 tons. Milliken Brothers will fabricate the 600 tons of Steel required for the Demmon Building, Boston. They have also taken the contract for the Duke residence, on Fifth avenue, New York, 300 tons, and for a theater at Coney Island, 160 tons. The new Crane shops, at Oakmont, Pa., near Pittsburgh, will be built by the American Bridge Company and the Riter-Conley Mfg. Company, 1000 tons going to each. The Prince Iron Works, New York, has taken the Yorkfield apartment building, 500 tons, and bids are going in on an apartment house on 110th street, 800 tons, and on a loft building on West Twenty-seventh street, for Max Cohen, 2000 tons. The new foundry for the Falk Mfg. Company, Milwaukee, will be built by the Worden-Allen Company, of that city. On the Prudential Life Insurance Company Building, Newark, N. J., 7000 tons, Post & McCord are low bidders, but the contract has not been let. At San Francisco, about 3500 tons of Steel work is pending, including 1000 tons each for the Hale department store and a city auditorium. At Duluth, Minn., an office building, a hotel and a school building are being figured on—about 1500 tons in all. The West Penn Steel Foundry Company, Tarentum, Pa., is figuring on a building calling for 1000 tons, and James B. Clow & Son on a Cast Iron Pipe foundry at Newcomerstown, Ohio, 600 tons. At Birmingham, Ala., the Clark department store, 1100 tons, is a pending contract. The John C. Haynes' estate, Boston, is receiving bids on a building requiring 400 tons. We quote plain material as follows, tidewater deliveries: Beams, Channels, Angles and Zees, 1.76c.; Tees, 1.81c. On Beams, 18 to 24 in., and Angles, over 6 in., the extra is 0.10c. Structural Material, cut to lengths, is sold in small lots at 2¼c.

Ferroalloys.—Prices are unchanged from a fortnight ago at $45, Baltimore, for Ferromanganese, and $65 to $67, Pittsburgh, for 50 per cent. Ferrosilicon.

Bars.—The market is firm on both Iron and Steel Bars. While the local demand has been light, sales agents report a much better trade coming from interior points, and it is noticeable that railroad shops are prominent in their urgency for the quick delivery of small lots. The prospects are excellent for a considerable increase in the demand with the advance of the month. Prices on Iron Bars range from 1.56c. to 1.60c., tidewater, while Steel Bars are still quoted at 1.56c., tidewater.

Plates.—The market is quiet, with prices firmly held on Standard Sized Plates as follows at tidewater: Sheared Plates, 1.76c. to 1.86c.; Flange Plates, 1.86c. to 1.96c.; Marine Plates, 2.16c. to 2.26c.; Firebox Plates, 2.65c. to 3.50c., according to specifications.

Cast Iron Pipe.—On Thursday the city of Baltimore placed contracts for 2700 tons of Water Pipe and a quantity of special castings. The contracts for the Pipe were divided between R. D. Wood & Co., Philadelphia, and M. J. Drummond & Co., New York, the former securing 1200 tons at $23.15 to $23.40 per net ton, and the latter 1500 tons at $24.15 per net ton. The special castings were divided between R. D. Wood & Co. and the United States Cast Iron Pipe & Foundry Company. The condition of trade at present can be characterized as quiet but hopeful. Carload lots of 6-in. are quoted at $24.50 per net ton, tidewater, for prompt delivery.

Old Material.—The new year opens with excellent inquiries and with higher quotations on a number of grades. Dealers maintain their firm attitude, and not only exhibit no desire to sell, but are strongly inclined to hold for outside figures. Heavy Steel Scrap appears to be the strongest article in the list, full prices having been obtained for the few lots recently sold. The cheaper grades of rolling mill stock have advanced because their relatively low prices had caused the demand to be diverted to them. The trade expects that much more business will develop after the middle of January. Quotations are as follows, New York and vicinity, per gross ton:

Old Girder and T Rails for melting	$15.50 to $16.00
Heavy Melting Steel Scrap	15.50 to 16.00
Old Steel Rails, rerolling lengths	16.00 to 16.50
Relaying Rails	22.50 to 23.00
Old Iron Rails	20.00 to 20.50
Standard Hammered Iron Car Axles	22.00 to 22.50
Old Steel Car Axles	19.50 to 20.00
No. 1 Railroad Wrought	18.00 to 18.50
Iron Track Scrap	16.00 to 16.50
No. 1 Yard Wrought, long	16.50 to 17.00
No. 1 Yard Wrought, short	15.50 to 16.00
Light Iron	10.00 to 10.50
Cast Borings	11.00 to 11.50
Wrought Turnings	12.00 to 12.50
Wrought Pipe	13.50 to 14.00
Old Car Wheels	15.00 to 15.50
No. 1 Heavy Cast, broken up	14.50 to 15.00
Stove Plate	12.50 to 13.00
Locomotive Grate Bars	12.50 to 13.00
Malleable Cast	13.50 to 14.00

The Berger Mfg. Company's Annual Convention.

The annual convention of the salesmen and branch managers of the Berger Mfg. Company, Canton, Ohio, was held at the Courtland Hotel, Canton, during the week beginning December 28 and ending January 2. Eighty-two men connected with the sales department of the company were in attendance. Among those present were the branch managers with headquarters in New York, Chicago, Minneapolis, St. Louis, Atlanta, Boston and Philadelphia. The banquet hall of the hotel was profusely decorated and at the head of the room was suspended a large portrait of the president, Ed. A. Langenbach, inscribed with the words, "Our Chief."

At the Monday night session President Langenbach spoke on the conditions of the past year, and outlined the company's policy for the coming year. A. T. Enlow, manager of the sales department, addressed the convention on "Sales Efficiency for the year 1909." He stated that in 1908 practically every salesman broke his own record for the previous year. During the sessions Tuesday the following subjects were discussed: "Roofing, Sides, Ventilators, Windows, &c.," led by George J. Smith; "Jobbing Lines of Eaves Trough and Conductor Pipe," by H. L. McKenzie; "Sales of Sheet Steel," by A. T. Enlow. Thursday evening a social gathering was held, the features of which were speechmaking, vaudeville and other entertainment. At noon Friday the visiting salesmen went to see the McKinley Monument.

During the week tests of the new Berger product, temporarily known as "bloom iron," were made before the convention. The convention committee announced that a suitable prize would be awarded to the salesman or manager suggesting the most appropriate name for the new iron, and a large number of names were submitted. Various forms of diversions from the routine of the convention were carried out. Saturday the visitors were taken for a trip through the plant. The convention closed with a banquet Saturday evening, with F. A. Schwertner, treasurer of the company, acting as toastmaster.

Ferrosilicon and Its Deadly Gases.—The danger arising from the noxious gases generated by ferrosilicon was described in *The Iron Age* of October 8, page 997. A recent case of this kind involved the death of five men, the whole of the occupants of the emigrants' quarters of a British steamship, which left Antwerp for Hull December 12. In the hold directly under the emigrants' quarters were 9 tons of ferrosilicon in barrels. All were killed by the gases which came up through a hatchway.

The receivers of Milliken Brothers, Inc., New York, have been authorized by the court to continue the business to March 1. They have paid all bills except current accounts and after paying interest on the first mortgage bonds have $500,000 cash on hand. It is stated that it has not been possible to raise $1,500,000 to make the reorganization plan heretofore proposed successful and the receivers have suggested to other parties to examine the business and submit a plan.

November Iron and Steel Exports and Imports.

The November report of the Bureau of Statistics of the Department of Commerce and Labor shows a falling off as compared with the previous month in the exports of iron and steel and manufactures thereof, while a slight gain is recorded in imports. The total value of the November exports, not including ore, was $10,895,937, against $11,505,063 in October. The figures for commodities for which quantities are given show a considerable decrease, being 70,907 gross tons, against 85,667 tons in October. The following table gives these exports for each month up to November of the past year:

Month.	Gross tons.	Month.	Gross tons.
January	74,352	July	86,806
February	81,755	August	87,198
March	96,437	September	76,727
April	93,522	October	85,667
May	64,020	November	70,907
June	69,778		

The details of the exports of the same commodities for November and for the 11 months ending with November, as compared with the corresponding periods of 1907, are as follows:

Exports of Iron and Steel.

	November.		Eleven months.	
	1908.	1907.	1908.	1907.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	4,875	6,184	41,964	70,599
Scrap	1,008	689	20,991	24,987
Bar iron	1,203	1,473	7,676	22,790
Wire rods	839	268	6,501	10,524
Steel bars	3,017	6,497	39,289	69,848
Billets, blooms, &c	9,432	8,698	104,284	74,831
Hoop, band, &c	212	1,013	3,885	7,244
Steel rails	10,705	30,141	186,167	318,143
Iron sheets and plates	3,286	4,615	39,595	36,689
Steel sheets and plates	5,215	6,365	53,965	76,855
Tin and terne plates	121	513	11,594	9,900
Structural iron and steel	6,416	11,267	106,943	129,041
Barb wire*	6,783	....	27,104	....
Wire	6,270	15,355	97,111	147,653
Cut nails	340	830	6,284	6,523
Wire nails	1,611	1,990	23,179	39,685
All other nails, including tacks	466	654	4,671	7,286
Pipes and fittings	9,108	19,757	105,305	163,365
Totals	70,907	116,309	886,508	1,215,963

* Not separately stated prior to July 1, 1908.

The total value of the imports of iron and steel and manufactures thereof, not including ore, for November was $1,858,037, against $1,466,436 in October. The imports of commodities for which quantities are given show a little gain, being 19,960 gross tons in November, against 13,214 tons in October. The imports of this character for each month of the past year, except December, are shown in the following table:

Month.	Gross tons.	Month.	Gross tons.
January	28,008	July	18,320
February	19,054	August	13,186
March	15,885	September	13,122
April	12,342	October	13,214
May	13,584	November	19,960
June	21,109		

The details of the imports of the same commodities for November and for the 11 months ending with November, as compared with the corresponding periods of 1907, are as follows:

Imports of Iron and Steel.

	November.		Eleven months.	
	1908.	1907.	1908.	1907.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	8,489	19,408	81,872	478,448
Scrap	281	897	4,029	26,516
Bar iron	2,764	3,093	18,565	35,854
Rails	350	107	1,671	3,551
Hoop, band, &c	214	31	910	1,458
Billets, bars and steel in forms n.e.s	1,247	5,397	9,009	18,441
Sheets and plates	260	313	2,235	3,517
Tin and terne plates	4,647	4,412	56,015	56,231
Wire rods	1,054	1,512	10,556	15,806
Structural iron and steel	654	112	2,954	2,271
Totals	19,960	35,282	187,816	642,093

The imports of iron ore in November were 91,735 gross tons, against 77,932 tons in October. The total iron ore imports for the 11 months ending with November were 652,559 tons, against 1,149,129 tons in the corresponding period of 1907.

The total value of exports of all kinds of iron and steel, not including ore, was $138,881,761 in the 11 months ending with November, against $182,068,912 in the corresponding period of 1907. Similar imports were, respectively, $18,247,668 and $36,740,291.

The Production of Copper, Spelter and Lead in 1908.

An early estimate of the United States production in 1908 of copper, spelter and lead, the three principal nonferric metals, has been prepared by the United States Geological Survey, which also furnishes approximate figures of the production and movements across the border.

Except one small company producers of blister and lake copper have furnished their latest exact figures; in most cases they are for 11 months, with estimates of their production for the remainder of the year. If these estimates are realized the production of blister and lake copper in 1908 will be greater than 1907 by about 22,321 gross tons, or an increase of 5 or 6 per cent. This would give a total production of approximately 410,000 gross tons. The total importations of copper are estimated at 93,300 tons, compared with 106,247 tons in 1907. The exports are estimated at 294,400 tons, compared with 227,200 tons in 1907. These figures were prepared by L. C. Graton, who has just issued a most excellent report on the production of copper in 1907.

The production of primary spelter from domestic and foreign ores is estimated at 208,000 tons of 2000 lb., as compared with 249,860 tons in 1907, 224,770 tons in 1906 and 203,849 tons in 1905. Imports of zinc ore aggregated 60,000 tons, practically all from Mexico, and show a decrease of nearly 50 per cent. from the quantities reported in 1907, which were 110,000 tons. The production of spelter in 1908 by States was as follows: Illinois, 49,500 tons; Kansas, 98,000 tons; Missouri, 10,000 tons; Oklahoma, 15,000 tons; Western, Eastern and Southern States, 35,500 tons. These figures were prepared by C. E. Siebenthal.

The production of lead was approximately 391,000 tons of 2000 lb., a decrease of about 6 per cent., as compared with 1907, when the production was 414,189 tons. In 1906 it was 404,699 tons. These figures are exclusive of an estimated output of 12,000 tons of antimonial lead in 1908 and 9910 tons in 1907. Desilverized lead in 1908 contributed 287,500 tons, as compared with the total production of 314,241 tons in 1907. Soft lead production increased in 1908, being 103,500 tons, compared with 99,948 tons in 1907. The importation of lead in ores and base bullion increased 50 per cent., amounting to 105,000 tons, compared with 70,538 tons in 1907. These figures of production were also prepared by C. E. Siebenthal.

Rebecca Furnace of the Kittanning Iron & Steel Mfg. Company, Kittanning, Pa., an entirely new stack, was put in blast on forge iron January 4. It has a daily capacity of 250 to 275 tons. The company has also increased the capacity of the power plant and has installed a new pumping system with a daily capacity of 3,000,000 gal. The mill for rolling muck bar is now idle, but will probably be started soon.

Stanley G. Flagg & Co., Philadelphia, manufacturers of pipe fittings and malleable and small steel castings, have discontinued their representation in New York on a commission basis, and have taken over the office previously used by them and are operating it as a part of their own sales department. R. G. Williams is in charge of it.

The Bessemer Coke Company, Lewis Building, Pittsburgh, has placed a contract for the building of 50 additional coke ovens at its Millsboro plant in Fayette County, Pa. This works now has 100 ovens, all of which are in operation.

PERSONAL.

L. T. Munson, formerly general manager and superintendent of the Bellefonte Furnace Company, Bellefonte, Pa., has resigned to accept a position in the sales department of the Bickford Fire Brick Company. 1122 Farmers' Bank Building, Pittsburgh.

The American Steam Gauge & Valve Mfg. Company, 208 to 220 Camden street, Boston, Mass., announces that on and after January 1 John B. Guthrie will be its sole representative in the Pittsburgh District, with offices in the Columbia Bank Building, Fourth avenue and Wood street, Pittsburgh, Pa. He has also been appointed representative of the Carpenter Steel Company, Reading, Pa.

The Walworth Mfg. Company, 128 to 136 Federal street, Boston, Mass., has made arrangements for representation on the Pacific Coast with S. V. Armstrong, who has been located in that section of the United States for the last 15 or 20 years, and has been identified with the small tool line. His office is in the Monadnock Building, San Francisco.

S. C. Munoz has resigned as vice-president and sales manager of the Rateau Sales Company, New York, and has opened an office at 2 Rector street, New York, for the sale of low pressure steam turbine plants and regenerators.

William Bispham, for many years a partner in the firm of William H. Wallace & Co., iron and steel merchants, 66 Broadway, New York, has retired, owing to ill health.

Archibald McAdam, sales manager of the Michigan Malleable Company, Detroit, severed that connection December 31 to accept the position of vice- president of the Damascus Brake Beam Company of Cleveland and Sharon, Pa. He will reside in Cleveland.

E. W. Pargny on January 1 became president of the American Sheet & Tin Plate Company; J. I. Andrews, general manager of sales, and Walter C. Carroll and Fred M. Fuller, assistant general managers of sales, with offices on the thirteenth floor of the Frick Building, Pittsburgh, Pa.

The American Air Compressor Works, 26 Cortlandt street, New York, announces that Frederick B. Vail, formerly sales manager, is no longer connected with the company.

Charles W. Brooke, formerly with the Westinghouse Electric & Mfg. Company, East Pittsburgh, has opened an advertising agency at 1312-1313 Machesney Building, Pittsburgh.

William Maxwell, for some years superintendent of the open hearth plant at the South Sharon Works of the Carnegie Steel Company, has been appointed superintendent of the new open hearth plant at the company's Ohio Works at Youngstown, which will probably be put in partial operation in February.

John Searight, for five years superintendent of the blast furnaces of the Carnegie Steel Company at New Castle, Pa., has resigned and has been succeeded by George Brown, formerly assistant superintendent. Howard Beck advances to the position formerly held by Mr. Brown.

Frank Pund, Jr., has taken a position in the sales department of the Cincinnati office of the Republic Iron & Steel Company. Elliott Knight, resigned, is now identified with the selling forces of the Sharon Steel Hoop Company. Both appointments were effective January 1.

H. T. Herr has assumed the position of general manager of the Westinghouse Machine Company, at East Pittsburgh, Pa.

The Chicago Steel Foundry Company, Rookery Building, Chicago, has secured the services, as superintendent of its foundry, of Charles Griffith Robinson, for 12 years assistant superintendent of an important steel casting company, now part of the American Steel Foundries.

Le Roy Gordon, formerly of the general office of the Chapman Valve Mfg. Company, Indian Orchard, Mass., and later with its Pittsburgh branch, has been appointed manager of that office to succeed Herbert E. Stone, recently resigned. This office is located at 47 Terminal Way, S. S., Pittsburgh, and has a stockroom attached to it.

OBITUARY.

HERMAN JUSTI, Commissioner of the Illinois Coal Operators' Association and writer on labor topics, died at his home in Highland Park, Ill., January 1, aged 56 years. He was born in Louisville, Ky.

CORNELIUS VAN HOUTEN, treasurer of the De Witt Wire Cloth Company, Belleville, N. J., died at his home there January 2, aged 83 years. He had lived in Belleville all his life. He was formerly connected with the wire cloth manufactory of William Stephens & Sons. He leaves a widow and two sons.

JOSHUA RHODES, for many years one of the prominent business men of Pittsburgh, died January 5 at his home in Allegheny, Pa., aged 87 years. He was born in London, England, and came to the United States in 1830 with his parents. When he was 12 years old he became a clerk in a grocery store and later started in the grocery business for himself. The fire of April 10, 1846, swept away every dollar he had. He went to New Orleans, where he remained two years, making lucky deals in coal. He returned to Pittsburgh and built a brewery and helped build the Pittsburgh & Lake Erie Railroad. He also built a cracker factory. He then leased a pipe mill on Herrs Island and later bought the property, forming the Pennsylvania Tube Company, of which he was president until it was absorbed by the National Tube Company, one of the underlying companies of the United States Steel Corporation. He was identified with many other enterprises as well as financial institutions. He leaves one son.

HENRY C. JONES of the Hilles & Jones Company, Wilmington, Del., died January 3, aged 71 years. He had not taken an active part in business for some time. He leaves a widow. He was born in Wilmington, and in 1863 acquired an interest in the firm of Robert H. Barr & Co., which had been established in 1854. The style was changed to Hilles & Jones in 1870. After the death of William S. Hilles in 1876 Mr. Jones assumed entire management of the business, and gradually changed it from the production of all kinds of machinery to a special line of machine tools for locomotives, railroad shops, boiler makers and bridge builders. In 1885 T. Allen Hilles, son of William S. Hilles, was admitted to the firm.

The Cincinnati Steel Foundry Sold.—John Markley and associates of Chicago, who own the Armor Steel & Foundry Company, Matthews, Ind., have purchased from Receiver Wm. B. Melish, the plant of the defunct Steel Foundry Company, Cincinnati, for $80,000. The plant has been idle more than a year. The appraisement of the plant in the receiver's report was $229,240.36 and the total liabilities were $99,356.30. The Markley purchase does not include the book accounts, which schedule $23,-119.84. The new purchasers propose to put the plant in operation at once and increase the capacity by adding another open hearth furnace. The payment of the $80,-000 is to be secured by depositing $250,000 of first mortgage bonds of the Armor Steel & Foundry Company in escrow with a Cincinnati trust company, and one-half of all sales of the bonds is to be applied as rapidly as such sales are made to the payment of the obligation until it is satisfied.

The Thomas Steel & Iron Company, Niles, Ohio, which was recently incorporated with a capital stock of $500,000, will on February 1 take over the plants of the Niles Iron & Steel Company and the Niles Corrugating Company, bringing both plants under one management. Many improvements will be made to both plants in the way of additions, which will make the new interest one of the strongest in its line. The company will manufacture a full and complete line of galvanized sheets, corrugated roofings, sheet steel, eaves trough and conductor pipe. The management will be in the hands of the following officers: W. A. Thomas, president; C. G. Thomas, vice-president and treasurer, and C. R. Thomas, secretary.

The Machinery Trade.

PROSPECTS FOR THE NEW YEAR.

NEW YORK, January 6, 1909.

The effect of the money panic was being severely felt at the opening of 1908. Although business was quite dull, it was nevertheless believed that the clearing of the financial atmosphere would restore confidence to the extent that trade would assume a normal condition by spring. This opinion was held by many of the machinery houses because of the large number of important projects that were planned or on which work of construction had begun but were temporarily suspended. It was also thought that the railroads and large industrial corporations which had retrenched in every possible way would only adhere to such a restrictive policy for a few months, as the financial situation was gradually clearing up and general conditions appeared to be improving; in fact, the trend of business was upward and a feeling of optimism prevailed. The first few months' trade continued very dull and spasmodic, the demand being made up almost entirely of requirements for single tools and small lots either for replacement or for small shops which were starting in business along special lines. In the spring the demand increased slightly, and this with the upward and active movement of stocks on the exchange afforded considerable encouragement; but the activity was short lived and trade soon became again dull, which condition continued with but slight change throughout the summer. The first eight months of the year were the exact reverse of those of 1907, when expansion was at its hight, the railroads bought more heavily than in any similar period in their history, and even with their greatly increased output machine tool builders could not supply the demand. Delivery dates were extended months ahead. During this period of 1908 manufacturers were operating their plants at less than half capacity, and both they and the dealers were exerting every energy to secure sufficient orders to keep their operating and selling forces intact. Aside from a very few, the railroads and important industrial buyers of machine tools were unimportant factors in the market, and lists of extensive requirements were scarce throughout the entire year. As a result the business secured was from scattered sources and was made up largely of single or small lots of tools. While this class of business is more profitable and more desirable when in sufficient volume to go around, its scarcity lessened the profit on sales to some extent by increased cost of sales departments in going after it and by cuts in prices made in certain quarters. On machine tools prices generally were maintained and the losses incident to indiscriminate reductions were avoided; prices, however, on power presses and other sheet metal working machinery, electric motors and some classes of electrical apparatus were reduced and a few of the smaller builders of machine tools also marked down prices. In September came the first betterment that was clearly seen to be the beginning of a gradual and healthy movement toward a higher level, and which was fairly well maintained throughout the remaining months of the year. Both time and forces at shops were considerably increased, some of the plants working up to about 80 per cent. of normal.

Contributing toward the improvement were the result of the Presidential election and the placing shortly thereafter of the $5,000,000 electrification contract by the Pennsylvania Railroad. A feature of the trade was the further expansion of two industries which were apparently not so much affected by the business depression and which greatly aided machinery manufacturers. These were the builders of automobiles and the makers of cement. The former made substantial purchases of machine tools for their 1909 output. As a result of the larger demand for automobiles garages were established throughout the country, some of them with fair sized repair shops attached, but practically all with some mechanical equipment installed. The construction of reinforced concrete buildings was carried on more extensively and many large cement plants were installed.

The trade is somewhat encouraged by the new projects of magnitude that came forward the past two weeks and by the number of inquiries figured on and which are expected to be closed shortly. It is true that they cover but a few tools each, but the aggregate will foot up a considerable sum. At the opening of the new year trade, though rather light, has an upward tendency and general conditions are such as to indicate a gradual improvement, but it will likely take some time to completely recover from the recent dullness. This opinion, held by many in the trade, is based somewhat on the attitude of the railroads, which is still that of waiting for the full employment of their rolling stock and shops before entering upon extensive improvements. At the present time earnings are insufficient to warrant the expenditure of large sums of money, and with few exceptions the railroads intend to confine their energies this year to the completion of work under way. A majority of the large systems report that any extensive work will be contingent upon better conditions than prevail at the present time. Plans have been prepared, however, for enlargement of mechanical facilities by some of the roads and these will probably be carried through this year. The same conditions prevail with the large industrial corporations as with the railroads, so it would seem that trade for a time, at least, would continue to consist of individually small requirements. While the immediate prospects for extensive lists of tools are not so bright, it is believed that the improvement in business will reach such proportions by the middle of the year that some of the important interests will be sufficiently employed to take up improvements. Among these are the two leading locomotive builders which are stated to be contemplating making extensive purchases of machine tools. Of the many developments that will require the purchase of machine equipment the more important are probably the electrification of railroads for suburban travel, construction of cement plants and automobile plants and garages. In view of the retrenchment on the part of the railroads it is thought that the latter two lines of manufacture will be of more immediate value to the trade. It is believed that the building of automobile trucks for commercial purposes will soon assume large proportions and it will not be surprising to see extensive plants erected for that purpose.

Last May witnessed the opening of the Machinery Club of New York, with the result that the trade now has a comfortable home in the Terminals Buildings at 30 Church street, where two floors are occupied by this flourishing organization, which now has a membership of 1300 recruited from all parts of the United States with a number of members abroad.

The Railway Business Association was organized in the fall to combat unfair public sentiment against the railroads. This organization has a large membership and it includes the more important manufacturers of railroad equipment. The association hopes to give encouragement to the railroad interests and promote confidence that will insure a substantial buying movement.

Export trade was especially good during the year in comparison with domestic business, and export men as a rule declare that they did not experience the same business depression that developed among the machinery trade in this country. This was largely due to the fact that machinery could be obtained for prompt delivery, and this gave American shippers a chance to compete with foreign manufacturers in getting delivery terms. The demand for sugar equipment for Cuba and the West Indies was not as large as that of the previous year, but no comparison should be considered in that respect as during 1907 some especially large sugar manufacturing enterprises were consummated. Last year saw a good general business in this line and it compared well with that of other years. There was a good demand from Europe for machine tools during the early part of the year, and considerable steel mill equipment was bought here. Later in the year export men were able to report a good business in the way of special machinery for the Continental countries, and the demand went far toward keeping up the general tone of the machinery market in this country.

Prospective Machinery Requirements of the Railroads.

From the small amount of work planned by the railroads for this year it is evident that at least for the first few months the business must come from the industrial plants. Purchases of considerable machinery will probably be made shortly by the Chicago & Northwestern Railroad, which recently issued a substantial list of machine tools, and the St. Louis & San Francisco Railroad, which is expected to send out its large list figured on about a year ago. The amount of construction work carried over and that thus far planned for the new year can be readily found by glancing at the more important projects that have come before the general notice of the trade.

From the viewpoint of purchasers of machinery for railroad shops the most important is probably the Delaware, Lackawanna & Western Railroad, which will undoubtedly purchase the large amount of machinery required for its new machine shop at Scranton, Pa., early in the year. This shop, which will be the largest of the group of buildings at that point, will be 346 x 582 ft., and it is understood that it is well along toward completion. The company has purchased a great deal of machinery for its various shops at Scranton, and these, with the new machine shop, will complete the group. In addition to the completion of the shops at Scranton and the cut-off between Lake Hopatcong and the Delaware Water Gap, the road is not planning any extensive work that will require mechanical equipment.

The Carolina, Clinchfield & Ohio Railroad, Johnson City, Tenn., will come into the market within the next three months for the entire equipment for its new shops which are to be erected at a cost of $200,000, which amount has been authorized and will be expended within the next 90 days. These shops are to be equipped with machinery for making repairs to the heavy equipment, and as they are to be the main shops of the road, a considerable amount of modern machine tools will be purchased.

The total of construction work planned for the year by the Erie Railroad is the completion of the four-track open cut through the Bergen Hills, which work is now under way. The company is preparing plans for locomotive and car shops and the electrification of its suburban lines, but none of this work is to be undertaken until earnings shall warrant.

While no definite announcement is made, houses in the trade are looking forward to considerable purchases of machinery this year by the Pennsylvania Railroad, in view of the fact that in 1908 the road purchased practically nothing in the way of mechanical equipment. The work is progressing nicely on its tunnels under the East and North rivers and also on its new station in New York. In the early part of November the road placed a contract with the Westinghouse Electric & Mfg. Company for $5,000,000 for the initial equipment for electrifying its New York terminals, including the stretch of track between Jersey City and Newark, N. J. While most of the equipment will be built by the Westinghouse Company, the carrying out of such a large contract will necessitate the purchase of equipment from time to time. The construction of a new boiler shop, to be about 80 x 280 ft., is contemplated at Renovo, Pa.

The Wheeling & Lake Erie Railroad has under consideration the erection of new shops, probably at Justus, Ohio, to take the place of those destroyed by fire in the fall.

The New York Central Railroad is proceeding with the improvements at its shops at West Albany, N. Y., for which a great deal of equipment has been purchased. This road has not sent out an extensive list of its requirements, but has been continuously in the market for some months, buying a few machines at a time.

The New York, New Haven & Hartford Railroad is planning to electrify its system from 129th street, New York, to New Rochelle, contract for which was let a few weeks ago. The expenditure for this work amounts to several million dollars, and will entail the construction of tunnels under the East River to Astoria, and the erection of a large passenger station, probably on the block bounded by Fourth and Lexington avenues and Thirty-second and Thirty-third streets, connected by subway with the Pennsylvania tracks. The company has had in contemplation for over a year the erection of new shops at New Haven, Conn.

The Delaware & Hudson Railroad is understood to have secured land for the erection of new shops at Watervliet, N. Y.

The Virginian Railroad, Norfolk, Va., has under consideration the erection of new shops, plans for which have been held in abeyance for some time.

The Western Maryland contemplates enlarging its shops at Hagarstown, Md.

It is likely that the Missouri, Kansas & Texas Railroad will proceed with its new construction work at Wagoner, Okla., in the spring. The size of the shops to be erected at that point has not been determined.

The Washington, Alexandria & Mt. Vernon Railroad, Washington, D. C., expects to erect car shops and a car barn at Lacey, Va.

New Industrial Plants and Additions.

While a considerable number of new plants and additions have been planned for the year, the construction of the more important ones will probably depend upon business conditions. Plans for many of the improvements have been held in abeyance for a long time and these are now expected to be carried out. It will be seen that few of them are from the large corporations, which prefer to wait until a more pronounced improvement in business takes place before announcing improvements. During the past year important purchases were made by the subsidiaries of the United States Steel Corporation, principally for the new plant of the Indiana Steel Company at Gary, Ind. Another project of noticeable importance which was completed was the new plant of the Standard Oil Company at Bayway, N. J.

In connection with the expansion of the iron and steel industries it will be of interest to recall the intention of M. A. Hanna & Co., Cleveland, Ohio, to erect two blast furnaces upon a recently purchased tract of land with 3000 ft. of frontage on the Niagara River, just north of Buffalo, N. Y.

The Lynchburg Foundry Company, Lynchburg, Va., owning and operating the McWane Pipe Works at Lynchburg and the Radford Pipe Works at Radford, Va., has purchased 28 acres of land at Norfolk, Va., with deep water frontage of 732 ft. and belt line railroad connection, on which it will build another pipe foundry for export and coastwise trade. Plans for this plant have not been prepared. The company is expending about $50,000 in making improvements to its Radford works, where an addition to the special foundry, 50 x 125 ft., will be erected.

The Reading Iron Company, Reading, Pa., will erect a new pipe mill to take the place of an antiquated mill which is to be abandoned.

Plans are being prepared for a large pipe foundry to be erected at Holt, Ala., by the Central Iron & Coal Company, New York. The plant will be devoted to the manufacture of soil pipe in standard sizes, and will have a yearly capacity of about 12,000 tons.

E. E. Linthicum, Anniston, Ala., and associates contemplate the establishment of a new cast iron pipe plant at Anniston.

Important improvements are contemplated by the two leading builders of locomotives, the more prominent of which now before the trade is the American Locomotive Company, which is understood to have under consideration the purchase of machine tools aggregating in value over $200,000. It is said that the list covering this large amount of machinery has been prepared, but has been held in abeyance for some time. The equipment is intended for increasing the efficiency of the various plants. The Baldwin Locomotive Works, Philadelphia, Pa., is also likely to come into the market in the near future for a great deal of mechanical equipment.

The International Car Company, New Orleans, La., is erecting a new plant, consisting of a planing mill, 60 x 100 ft.; blacksmith shop, 60 x 75 ft.; machine shop, 60 x 60 ft.; power house, 60 x 110 ft.; two open worksheds, 80 x 600 ft., and office building, 60 x 100 ft. The buildings will be of structural steel and are being built on a site of 38 acres.

A recent project of importance is that of the York Mfg. Company, York, Pa., which is to spend $250,000 in enlarging its plant for the manufacture of refrigerating machinery. Of this amount about $100,000 will be spent for equipment, a great deal of which will be required for its new machine shop, which will be 100 x 230 ft., with a 40-ft. center bay and 30-ft. galleries on either side. The construction of this shop will be started as soon as possible, and upon its completion other buildings will be erected.

Next spring the Ames Iron Works, Oswego, N. Y., manufacturer of engines and boilers, will come into possession of the ground necessary for the proposed extension of its works, and it is likely that soon thereafter the construction of new buildings will be started. The plans for improvement include the erection of modern buildings for the manufacture of boilers, covering a space of about 200 x 400 ft.; the removal of the foundry from the present location to the present boiler shop, 100 x 400 ft., and the enlargement of the machine shops to include the space from Cayuga to Seneca street. A main power plant will be established in which will be installed all the power machinery. The total present area of floor space of the shops is about 134,600 sq. ft., which will be increased to 259,090 sq. ft. by the new buildings.

The Steel Car Forge Company, Elwood City, Pa., has purchased the property of the Pennsylvania Stove Company, consisting of a number of buildings which will be used for extensions to its plant.

The A. P. Smith Mfg. Company, Newark, N. J., expects to begin work early in the year on the construction of its new plant for the manufacture of tapping machines, valves and general supplies for water works, which is to be built at East Orange, N. J., adjoining the plant of the Sprague Electric Company. The main building will be about 50 x 215 ft., of reinforced concrete construction, and there will be a three-story pattern storage building, 45 x 90 ft.; power house, about 40 x 60 ft.; casting, storage and cleaning building, 50 x 100 ft., and a machine shop, 100 x 155 ft.

A new plant is being erected by the Heine Safety Boiler Company, St. Louis, Mo., at a cost of about $300,000. The plant will consist of a main building, 140 x 400 ft.; flange shop, 60 x 180 ft., and a power house, 75 x 80 ft. As soon as the buildings are ready for occupancy the present plant will be abandoned.

The T. H. Symington Company, Baltimore, Md., has secured an option on 20 acres of land at Rochester, N. Y., where it will erect a large plant for the manufacture of malleable iron journal boxes for freight and passenger cars, ball bearing center plates and miscellaneous malleable castings used by railroads. The plant will consist of several buildings, including a large machine shop, foundry and power plant. Most of the equipment of the present plant at Corning, N. Y., will be moved into the new buildings when completed. On account of the large increase in capacity of the new plant a great deal of additional machinery will be required. All of the buildings and much of the equipment are being planned and designed by George K. Hooper, consulting engineer, 11 Broadway, New York.

The Cutler-Hammer Mfg. Company, Milwaukee, Wis., New York office, 50 Church street, has purchased property on 144th street, where it is understood a manufacturing plant will eventually be established.

Another project that will necessitate the installation of a large amount of new machinery is the new plant to be erected at Oakmont, Pittsburgh, Pa., by the Crane Mfg. Company, Chicago, Ill.

The Crosby Company, Buffalo, N. Y., is building two three-story brick additions, each 60 x 124 ft., and a four-story brick building, 40 x 146 ft., which will represent an investment of $200,000. As part of the new equipment about $40,000 worth of metal working machinery will be installed.

The La May Machine Works, Rochester, N. Y., recently received preliminary bids for a long list of machine tools for its new plant, and it is expected that this machinery will be purchased shortly. The equipment is for the first group of

buildings to be erected, which will consist of a main building, 180 x 200 ft.; brass foundry, 30 x 50 ft., and a power plant, 40 x 60 ft. When these buildings are finished construction will be started on a malleable iron foundry. The larger machines are to be operated by individual motors and the smaller from motor driven line shafts. The plant is being erected to manufacture tapping machines, can making and canning machines, and automatic high speed machines for various lines of manufacture.

The Pratt Institute, Brooklyn, N. Y., has plans for a new forge and foundry building.

The Losier Motor Company, Plattsburgh, N. Y., will erect a machine shop, 150 x 162 ft.; blacksmith and testing building, 50 x 90 ft., and storehouse, 50 x 90 ft. It is understood that the equipment for these buildings has not all been purchased.

The Harlan & Hollingsworth Corporation, Wilmington, Del., is making improvements to its plant, including the erection of a new underframe shop.

The Ford Motor Company, Detroit, Mich., is about completing its new four-story building, 75 x 865 ft., for which it will likely buy considerable new machinery.

The W. Eddy Plow Company, Greenwich, N. Y., has under consideration the erection of a new plant with increased capacity. The development of electric power from the present water power for running the machinery is also being considered.

The E. I. Dupont de Nemours Powder Company, Wilmington, Del., has been looking into the requirements of a plant for the manufacture of cartridges, but has not definitely decided upon the erection of such a plant.

Owing to the large demand for Maxwell automobiles and excess freight rates from the eastern and central parts of the country to the Pacific Coast, the Maxwell-Briscoe Motor Company, Tarrytown, N. Y., intends to erect a new plant in the vicinity of San Francisco, to produce cars for the Western trade. A plant will be erected of sufficient size to produce 4000 runabouts a year.

The Kennedy Valve Mfg. Company, Elmira, N. Y., has prepared plans for an extension of its valve department.

The Luitwieler Pumping Engine Company, Los Angeles, Cal., intends to erect a plant in the East for the manufacture of steam, gasoline and electric pumping engines, fire apparatus, &c. Property in Rochester, N. Y., is under consideration.

The New York Engine Company, which recently purchased the plant of the Watertown Engine Company, Watertown, N. Y., is having plans prepared for large additions to the machine shop and foundry. In connection with the manufacture of steam engines the company will engage in the manufacture of gas engines of an improved type.

The Automatic Car Equipment Company, Buffalo, N. Y., is to erect a two-story building, 180 x 240 ft., of brick, steel and concrete, which it will equip with modern machinery.

The Jamestown Metal Furniture Company, Jamestown, N. Y., which is erecting a new building, 60 x 230 ft., five stories high, is to erect three building of equal size, the four to comprise a new plant. The mechanical requirements of the company cover principally power presses.

The Hammond Iron Works, Warren, Pa., is building two new buildings, one 43 x 190 ft. and the other 56 x 122 ft., and when these are completed the company will have one of the largest plants in the country devoted exclusively to steel tank and steel plate construction.

The Connellsville Iron Works, New Haven, Pa., which recently erected an addition to its plant, is expected to erect another addition this year, 30 x 60 ft., and to install drills, a shaper, lathes, &c.

The Midland Bridge Company, Kansas City, Mo., contemplates the erection of a new bridge shop.

The Curtin-Hebert-Anthony Company, Gloversville, N. Y., recently purchased a site where it intends to erect a modern machine shop and foundry. Plans for the new buildings will not be ready before spring.

The Emerson Steam Pump Company, Alexandria, Va., has purchased 3 acres of ground on which it will erect a new plant. Additional machine tools will not be purchased until the building is completed.

The Cascade Foundry Company, Erie Pa., will erect an addition to its foundry, 80 x 100 ft., of brick and steel construction, which will be equipped with a 10-ton traveling crane, molding machinery, &c.

Through the offices of the Attorney-General, the State of New York has purchased 600 acres of ground in Yorktown, Westchester County, where a training school will be erected in the spring. As it is the intention to teach various trades in the school, it is probable that a complete mechanical equipment will be installed.

The Onondago Litholite Company, Syracuse, N. Y., will erect a new plant, the main building of which will be 50 x 250 ft., and there will be a pattern shop and power plant, 50 x 75 ft., two stories. A few weeks ago the company was receiving bids on a 7½-ton electric traveling crane with 25-ft. span, sand molding machines, pattern making and woodworking machines, general foundry equipment, &c.

The Georgian Mfg. Company, Binghamton, N. Y., with which are connected several officials of the Fairbanks Company, New York, and which purchased the plant on Glenwood avenue formerly occupied by a stove company, has let contract for the erection of a new building with 16,000 sq. ft. of floor space. The company will erect other buildings in the spring. When its plans for construction at that point have been completed the installation will represent an investment of about $300,000.

The Bergman Tool Company, Buffalo, N. Y., which is to erect a new building for the manufacture of light tools and hardware specialties, expects to purchase some equipment early in the year.

The Buffalo Metal Furniture Company, Buffalo, N. Y., has purchased a site at Niagara street and Bird avenue, where it will erect a new plant for the manufacture of steel wire and other metal furniture.

The North American Asbestos Company, Kansas City, Mo., is to erect a new mill at a cost of $30,000. Plans for the plant and its equipment are being drawn, and it is expected that construction work will be started in the spring.

The Mississippi Valley Iron & Steel Company, St. Louis, Mo., recently incorporated with a capital stock of $1,500,000 by H. F. Albers, who has offices in the Singer Building, New York, and others, intends to erect a blast furnace and operate ore properties in the vicinity of St. Louis.

The Hyle Spring Hub Company has incorporated at Buffalo, N. Y., to manufacture spring hub wheels for automobiles and other vehicles under patents of William A. Hyle. The company has not yet decided whether to locate its plant at Buffalo or Jamestown, N. Y., or Warren, Pa.

The DeKleist Musical Instrument Mfg. Company, North Tonawanda, N. Y., and the Rudolph Wurlitzer Company, Cincinnati, Ohio, have consolidated under the name of the Rudolph Wurlitzer Mfg. Company, which will erect a three-story brick addition to its plant at North Tonawanda.

Selden S. Deemer, New Castle, Del., and associates have organized the Deemer Steel Casting Company, with a capital stock of $250,000, and have secured property on the Delaware River upon which they will erect a new plant.

The International Smelting & Refining Company, recently organized at Trenton, N. J., with a capital stock of $50,000,000, is planning to erect large copper smelters. John D. Ryan and others prominently connected with the Amalgamated Copper Company are interested in the new enterprise.

The new cement plants established the past year have brought considerable business to the machinery trade, and several are planned for which equipment will be purchased early in the year. Among these is the Lumbermen's Portland Cement Company, for which Victor Beutner, engineer for the Altoona Portland Cement Company, Altoona, Kan., will erect a plant at Carlyle, Kan., on the Atchison, Topeka & Santa Fé Railroad. The equipment for this plant for which inquiries are about to be sent out covers four 550-hp. natural gas engines, one No. 8 gyratory crusher, three intermediate crushers, four 412-kw. alternators, 3000 hp. of motors in various units, conveying and elevating machinery, &c. Mr. Beutner also has plans for the erection of a plant of the same size for the Union Portland Cement Company to be constructed at Gas, Allen County, Kan., for which he will purchase equipment similar to that required for the Lumbermen's Portland Cement Company.

The American Cement Engineering Company, New York, is to construct for the Knickerbocker Portland Cement Company two cement plants on the Hudson River, with a combined daily capacity of 12,000 bbl. Work will first proceed with the rebuilding of the 2000-bbl. plant at Hudson, N. Y., increasing the capacity to 6000 bbl., and early in the year the construction of a plant near Catskill will be started.

Toward the end of the month the Dyett Sand Lime Brick Company, New York, for which Frederick L. Smith, 5 Beekman street, is engineer, will send out inquiries for the mechanical equipment for its new plant to be erected at Port Jefferson, L. I. The main building will be 60 x 220 ft., and the equipment will include three 150-hp. horizontal tubular boilers, one 300-hp. simple engine, feed water heaters, pumps, &c. For the manufacture of the brick a new press will be used which is the invention of James H. Dyett.

The Allentown Portland Cement Company, Allentown, Pa., which recently placed an order for $100,000 worth of machinery for its new plant to be built at Evansville, Pa., is understood to have under consideration the erection of a new plant at Allentown, after the one at Evansville has been placed in operation.

Some Important Projects Held in Abeyance.

The panic of 1907 caused the suspension of work on plans for many large projects, which were held in abeyance the whole of 1908 and which will not be brought forward this year unless business shall resume normal proportions. While they have been previously referred to in these columns, it will be of interest to note a few of the more important.

The Boston & Maine Railroad intends to erect new shops at Somerville, Mass., which will be equipped for both locomotive and car repairs. The road has had these shops in

contemplation for over a year, and while it does not at the present time intend to proceed with the work in the near future, it is probable that a resumption of activity will bring the matter to a head and announcement of its plans be made by the latter part of the year.

The Norfolk & Southern Railroad contemplates making improvements to its shops at New Bern and Berkley, Va.

The plans of expansion of its facilities by the American Car & Foundry Company, St. Louis, Mo., include the erection of a new plant at Gary, Ind., and additions at St. Charles, Mo., and Memphis, Tenn.

The General Electric Company purchased some time ago property at Erie, Pa., where it will erect a new foundry. No decision has been made as to when work on this new plant will be started.

The Oscar Barnett Foundry Company, Newark, N. J., has not yet decided to go ahead with the erection of its new plant.

The Buffalo Foundry & Machine Company, Buffalo, N. Y., which prepared plans the latter part of 1907 for a new machine shop about 160 ft. long, has not yet decided to proceed with its construction.

The J. H. Ladew Company, Newark, N. J., which purchased a 20-acre site on the Newark meadows for its new plant, has not yet announced its intention to proceed with construction work at an early date.

Power and Tunnel Work.

During the year just passed manufacturers of power equipment did not fare quite so badly as the general machinery trade, largely because of the fact that there were considerable purchases for large hydraulic power plants, the development of which was a feature of the year's business. The first of the year also saw the last of the buying for a number of subway and tunnel projects in the vicinity of New York. Manufacturers of the smaller class of engines and boilers did not, it is true, experience such a good year's business as they had hoped for, and this was largely due to the fact that many building projects which were scheduled for completion during the year were not carried out because of the tightness of the money market.

A number of large hydro-electric plants now in course of construction and several large projects of the kind in contemplation promise a fairly good year's business for the power people from that source, while it is said in many quarters that the building trade is already picking up to some extent and a great many proposed buildings, the plans of which were put off from time to time, will be constructed during the year.

Among the larger water development power plants to be built during the year will be that of the Knoxville Power Company, National Bank Building, Washington, D. C., which has plans completed for a 32,000-hp. hydraulic electric plant on the Little Tennessee River. This plant will cost in the neighborhood of $2,000,000, and the requirements will include five 9000-hp. turbine units, two exciter turbine units of 400 hp., both of which will be direct connected to 250-kw. direct current generators. The requirements for generators also include five 5000-kw. machines for direct connection to the turbines. The engineering details are in charge of Pressy & Weller, Hibbs Building, Washington.

Preliminary plans have been prepared by the Western Coal & Coke Company for a hydro-electric power plant to develop the water power of the Youghiogheny River in the vicinity of Friendsville, Md., for which John L. Bogart, 141 Broadway, is the consulting engineer. The company expects to develop about 20,000 hp., which is to be used for coal mining, lighting and general manufacturing purposes, and the scheme includes some extensive dam construction. No equipment has been purchased for this plant as yet and the plans are only in a preliminary stage.

The Montreal Light, Heat & Power Company, Montreal, Canada, is planning a large steam power plant which will eventually produce 100,000 hp. The general details have not been completed as yet, but it is stated that the plant will be constructed only in units as necessity demands, but a considerable portion of it will be done during the year.

During the year the trade may hear of requirements for the power plant which the New York Edison Company planned to build last year at 201st street and the Harlem River, but suspended the construction work because of a lack of sufficient demand for power to warrant the erection of the plant. As has been stated before, the foundation for the building was laid and an inquiry was sent out for 12,000 tons of structural steel, which was afterward revoked. The company has by no means decided to abandon its plans in respect to the erection of the building, and if there is sufficient increase in business to create a larger demand for power from the company the trade may see the resumption of work on the proposed plant.

The Metropolitan Electric Company, Reading, Pa., has planned to build a power plant at a cost of $1,500,000. As yet the full details have not been worked out, and the company is arranging to issue first mortgage bonds to cover the expense.

One of the big power projects which it is officially stated will be carried out during the year is that of the Goose Creek Railroad & Power Mfg. Company, Jesup, Ga., for which D. G. Ziegler & Co., Empire Building, Atlanta, Ga., are consulting engineers. The company has arranged to construct an electric railroad about 24 miles long, and a power plant of about 3000 hp. will be built. The company will operate a cotton mill and cotton seed oil mill, and the engineers will purchase the machinery for these plants in addition to the power and electric railroad equipment. The same interests have under consideration the construction of a hydro-electric plant on the Suwanee River about 50 miles from Jacksonville, Fla., where it is estimated 50,000 hp. can be easily developed. This enterprise will necessitate the expenditure of more than $3,000,000 and bids on the more important work have been secured.

Peter Stipp, Scranton, Pa., has the general contract for the construction of a power plant for the Scranton Railroad Company now in course of construction. The plant will have a capacity of 2400 hp., and while the principal power equipment has been purchased, it is probable that some additional business will come from that source before the plant is completed.

The Albany Power Mfg. Company, Albany, Ga., has purchased property at Porter Shoals, near Albany, where it intends to erect a dam and power house to generate about 10,000 hp. and which will supplement an existing plant now supplying power and light in the vicinity of Albany. J. E. Sirrine is chief engineer of the company, and it is thought that plans will be prepared and work begun on the scheme some time during the year.

The Public Service Corporation of New Jersey will shortly begin the erection of a new terminal at Hoboken, N. J., which will be built of steel and concrete, and will have a width varying from 60 to 160 ft. and a length of 400 ft. The structure will be used as a general terminal for the company's various trolley lines leading into Hoboken and will connect with the McAdoo tunnels. The Public Service Corporation has offices in the Prudential Building, Broad street, Newark, N. J.

J. G. White & Co., 43 Exchange place, New York, is now engaged in building a large power plant at International Falls, Minn., for the Minnesota & Ontario Power Company. This plant will be used to develop water power for running a ground wood sulphite and news print paper plant. About 25,000 hp. will be developed. The buying details are being handled in Minneapolis, where the Minnesota & Ontario Power Company has established an office.

An enterprise that may call for some extensive purchases of machinery is that of the Boston, Cape Cod & New York Canal Company to construct a new water way connecting Buzzards Bay at the mouth of the Monument River and Barnstable Bay, passing through the towns of Bourne and Sandwich. This is one of the biggest water way enterprises to come up this year.

The recent incorporation of the Delaware Tunnel Railway Company of Pennsylvania and the Camden Tunnel Railway Company in New Jersey, and the subsequent legislation providing for the construction of the two tubes under the Delaware River, give fair assurance that the long contemplated project will be begun this year. It is estimated that $10,000,000 will be required to complete the work, and from all accounts the necessary arrangements have been made. Richard I. D. Ashbridge is chief engineer and he will take up the plans prepared a year or so ago by engineers employed to make preliminary estimates. The combined mileage of the tunnels will be about 4 miles, and the trade in the vicinity of New York can make a fair estimate on the requirements by referring to the inquiries they had during the construction of the Hudson tunnels.

It is probable that this year will witness the construction of part of the Fourth Avenue Subway in Brooklyn. It will be remembered that the Public Service Commission awarded contracts for building five of the six sections planned, but later rescinded its action. It has been pointed out, however, that the urgent need of subway accommodations in Brooklyn will result in the construction of at least the first section, and the trade may look for a call for bids on this work before long.

New Shop Construction in Canada.

At times during the past year when domestic business was very scarce considerable trade was received from foreign countries, the more prominent of which were probably Canada and Mexico. As in the United States, business in Canada was not so active and consequently new construction fell off to a considerable extent.

A project that has been under way for some time, but on which work was started a few months ago, is the new plant being erected at Winnipeg, Man., for the Grand Trunk Pacific Railroad, under the supervision of the Trans-Continental Railway Commission, whose office is at Ottawa, Ont. The first group of shops to be erected, the main building of which will be 174 x 823 ft., will involve the expenditure of about $500,000. We understand that it is the intention to eventually spend about $1,000,000 in construction and equipment at that point. These shops will necessitate the purchase of a large amount of mechanical equipment, the

greater portion of which will probably be purchased from the Canadian branches of houses in this country.

The Trans-Continental Railroad, Ottawa, Ont., contemplates the erection of new shops at St. Boniface, Canada.

The Canadian Northern Ontario Railroad is to erect shops at Toronto, Ont., plans for which have not been completed. W. P. Chapman of Mackenzie, Mann & Co., Toronto, Ont., is resident engineer.

About $65,000 worth of iron working machinery, consisting of screw machines, lathes, milling machines, &c., was destroyed in the recent fire at the plant of the National Mfg. Company, Pembroke, Ont., and most of this machinery will have to be replaced inside of a few months. The company will supply the trade from its plant at Ottawa until the burned works can be rebuilt.

Early in the spring the Canadian Crocker-Wheeler Company, Ltd., Montreal, Canada, was organized for the manufacture and sale in Canada of the well-known Crocker-Wheeler electrical apparatus. The new company intends to erect a plant, plans for which have not yet been announced.

The Empire Meter & Engine Company of Canada, Winnipeg, Man., has been incorporated with a capital stock of $125,000, and next spring will erect a plant for the manufacture of water meters and water works supplies. Plans for the new buildings have not yet been completed. Those interested in the enterprise are George L. Rice, George Irving and George Goodfellow of Chicago, Fred J. Darch of London, Ont., and W. R. K. Magill, Winnipeg.

The Dain Mfg. Company, Ottumwa, Iowa, has purchased considerable land in Welland, Ont., where it will erect a new plant for the manufacture of stackers, loaders, presses and other agricultural machinery. For the erection and operation of the plant a Canadian company has been organized, with a capital stock of $200,000. The company has been meeting the demands of its Canadian trade for some years by assembling parts at Preston, Ont.

The Canadian Palace Car Company, Montreal, Canada, in which A. J. Estes, Sovereign Bank Building, is interested, is perfecting arrangements to manufacture parlor cars in Canada under rights obtained from the American Parlor Car Company, New York.

It is expected that the Tata Iron & Steel Company, Bombay, India, will proceed in the spring with the erection of its new plant, which will necessitate the expenditure of about $7,000,000. The plant will include blast furnace, open hearth steel furnaces, rolling mills, &c. Contracts for the equipment will be placed from the engineering office of Julian Kennedy, Pittsburgh.

The Week.

In their application for permission to issue $4,250,000 of receivers' certificates, the receivers of the Seaboard Air Line state that $3,000,000 of this amount will be spent for making improvements to the system. Considerable construction work in the way of bridges and buildings will be undertaken, $15,000 being appropriated for an extension to the Jacksonville shops and $7000 for a coaling station at Columbia, S. C. The additional equipment to be provided for includes 15 locomotives, 750 freight cars and 15 passenger, express and baggage cars.

The American Concentrator Company, Joplin, Mo., designer and builder of coal and iron washing plants, desires a location for a plant for the manufacture of its product, preferring to secure a well equipped plant if one can be had at a reasonable figure. The company will require a foundry, machine shop and woodworking shop. Its largest customer is the coal department of the Delaware & Hudson Railroad in Pennsylvania, and a number of successful plants have been established in the East and South. A site for the plant is desired conveniently near the Pennsylvania coal fields and iron ore fields of Pennsylvania, Virginia, Tennessee and Alabama. F. E. Butcher is vice-president and general manager.

The Levering & Garrigues Company, 552 West Twenty-third street, New York, has inquiries in the market for a 100-kw. engine and generator for early delivery.

A movement has been started looking toward the establishment of a large packing plant on the Hackensack meadows, N. J. The new enterprise is said to be backed by English and Canadian capitalists, and it is understood that construction of buildings will be started in the spring. The names of the capitalists connected with the scheme have not been made public.

In connection with the construction of the Erie Barge Canal plans have been brought forward for an elaborate plan of water storage in the Adirondacks and at various other points in the State, to be constructed at a cost said to be equal to the amount to be spent on the canal work. The plans contemplate the impounding of streams in large reservoirs at points where the maximum amount of power can be obtained and the water power thus developed to be sold to private concerns, which it is claimed will net the State a good profit on the investment. It is stated that a large number of manufacturing plants are so situated as to be able to use the power.

Douglas Gordon, who has been connected with an American engineering company as manager for a number of years, is making arrangements to establish himself in London next April and desires to get in touch with American machine and supply manufacturers with a view to selling their products in the British Isles. Mr. Gordon's present address is 165 Naples road, Brookline, Mass.

The New England Machinery Trade in 1908.

BOSTON, MASS., January 5, 1909.

The year 1908 will go down in the annals of New England, in common with the rest of the country, as a time of marked industrial depression. The machine tool trade has been hit as hard as any line, and harder than most. The manufacturers have been running their shops on short hours during most of the year, and with forces reduced from normal all of the 12 months. Some of the important machine shops have been closed down completely at times, excepting that a few men have been kept at work making necessary repairs and, in some cases, rearranging tools and generally improving the order of things with a view to making more economical the handling of work and its manufacture. The machinery dealers have not prospered; it has been a lean year for them, a condition the easier to bear because of the huge totals of business and the excellent profits which show on their books for the two preceding years. The trade is now able to look backward with philosophical contemplation because of the wholesome aspect of the present situation and the knowledge of business that will be booked as soon as customers reach the buying point, which is believed to be soon. In the machine tool business, more pronouncedly than in most, profits must be reckoned on an average of years. In connection with this element of the situation is the accumulation of stocks which some of the machine tool concerns have built during the year. Storehouses are filled with them, especially engine lathes. Experience has shown that where a manufacturer of standard machine tools has the capital with which to continue manufacturing in dull times it is easy to dispose of the product when the demand again becomes brisk, for the reason that the machine tool output of the country does not equal the calls made upon it in a really brisk condition of trade. It is also interesting to note that while the machine shops have not increased in size and equipment during the year, some of them have been so reorganized that the total production of machinery in New England will doubtless be greater than ever before when the shops are again running full.

The railroads have done little buying. Some comparatively small improvements to repair shop facilities have been started, but the inclination has been to conserve financial resources and buy nothing that was not absolutely necessary. Some sure business from this source is in sight, however, to be placed probably early in the year. The most important happening of 1908 in New England railroad circles, in its relations to the machinery and supply trade, as well as to the locomotive and car builders, is the action of the New York, New Haven & Hartford Railroad in securing control of the Boston & Maine system, which has been permitted to run down and requires the expenditure of very large sums of money to rehabilitate it along modern lines. The initial expenditure as planned will be a large one, and the machine tool trade hopes soon to see a realization of the long contemplated establishment of great shops in Somerville, near Boston.

While New England is pretty well supplied with electric street railroads, there are a number of important enterprises which have been waiting a favorable condition of the money market for their fulfillment. The next two years will probably see several undertakings of this sort carried through, involving large contracts for rails, power equipment, repair shop machinery, rolling stock, wire, structural steel for bridges and supplies in general. The projects include several interurban lines, which when carried through must have the very best of modern equipment.

The textile industry has revived to such a degree and its confidence in the future is so strong that the textile machinery business has improved to an extent far beyond the expectations of the manufacturers. This business has been of late one of the most substantial of the customers of the machine tool people, ranking second, perhaps, to the automobile industry in this respect. The latter business has been the anomaly of the year; its prosperity everywhere has been extraordinary and has been reflected in many general lines of manufacturing. The shoe machinery builders have had rather a quiet year, though the shoe business itself has shown a good deal of improvement in the last six months. The paper business has been good enough to cause the placing of orders for a considerable amount of machinery for its manufacture, so that the paper machinery builders have had periods of genuine activity. The agricultural machinery trade has had a varied experience, largely depending upon the location of its market. The great grain and corn regions of

the West have been large buyers, but in other sections, though crops were good enough, the year followed a period of farming prosperity during which new equipment had been generously purchased, so that there had to be some falling off from normal buying. The wire business is reviving. The great Worcester Works of the American Steel & Wire Company are now running at about 70 per cent. capacity, manufacturing specialties almost exclusively, and the other mills of Worcester, which is the center of this line of manufacturing in New England, are correspondingly busy, and in some cases are running at much nearer full production. In the wire trade manufacturers believe that the pending tariff legislation is having an important influence.

The year has been a dull one with the builders of power equipment, excepting certain of the manufacturers of gasoline engines of small capacity, who have prospered surprisingly as compared to most industrial lines, though not doing a full business. The early part of the year saw the boiler makers fairly busy, but the business has not revived much up to the present time. The engine builders have some work in their shops, but are running short hours and with reduced forces. The foundries have had a very poor year indeed, but there has been some improvement in the last quarter. The shipbuilding industry of New England deserves a few words, because of the fact that it is flourishing more vigorously than for years. The Maine yards are building or laying down an unusual tonnage of sailing vessels, almost exclusively schooners for the coast trade, while the large yard of the Bath Iron Works, Bath, Me., has some Government contracts for steam vessels. The Fore River Shipbuilding Company, Quincy, Mass., has large Government contracts. Altogether, it is years since the outlook for the shipbuilding industry has been so bright.

New England manufactures vast amounts of electrical equipment and supplies of all descriptions. This industry has been hard hit during 1908. Occasionally one hears of a concern that, because of the special nature of its product, has done fairly well in spite of adverse circumstances, but such instances are exceptions. At the present time there is a notable increase in the volume of business; the percentage of production to full capacity has gone up materially, and the prospect is bright for 1909. The electric industry constitutes a very important element in the machinery trade: its absence has been felt strongly, and its promised entrance into the market as a buyer will have an important influence in bringing business back to one of satisfactory profit.

The brass industry of Connecticut had a very dull time during the first half of the year, but experienced a decidedly favorable turn in the fall, and, generally speaking, there has been little falling back, though the usual effects of the closing weeks of the year were felt. The manufacturers of brass specialties are doing well, and so is the hardware industry as a whole, though here, too, a slight reaction has been felt during December.

In the great field of general manufacturing, which is a strong factor in New England industries, experience has varied widely. Certain lines have felt the depression very little, while others have done a fair business, taking the year as a whole. Manufacturers of products that are close to the consumer, especially to the consumer of the agricultural sections, have suffered far less than such lines as machine tools. There are not a few instances of manufacturers who have complained of dull times but who, on investigation, have found their business equal to what they could have produced, say, three years ago, before the great volume of business impelled them to increase their facilities. The year closed with the curve of business well started on its ascent toward another period of prosperity.

The Week.

Dealers report that December's business was only slightly less than that of November, which was the best month of 1908. The totals for the holiday month were rather a surprise, for a sharp falling off had been expected. The first few days of the new year have shown a healthy condition of the market, though no great accession of orders has been noted. Inquiries for small lots have been unusually numerous, and from now on the larger buyers are expected to become more active in replenishing and increasing their equipment.

The real strength of the machinery market was evidenced in a striking manner at the auction sale of the equipment of the Eastern Shipbuilding Company, Groton, Conn., last week. Great interest was shown; large numbers of manufacturers all over the East were represented, with the intention of buying, and some dealers were present, in the hope of picking up bargains in second-hand tools. Contrary to all expectations, prices ranged high; so high, in fact, that hardly a machine was bid in by the dealers, users of machinery sending the figures to prohibitive levels. It is estimated by dealers that the machine tools proper sold for nearly if not quite three-quarters of the present prices for new machinery, and a still larger per cent. of the cost to the company some 10 years ago, when lists were much lower. Other equipment brought satisfactory figures. The large shipbuilding companies took most of the heavy special machines and the cranes, and the heavy bending rolls went to a Pennsylvania steel works. The free bidding by manufacturers shows their confidence in the business outlook. Prices were much higher than have prevailed at any machinery auction for a year or more. The truth is that prices paid were higher than the dealers have been getting for tools of similar age and character. They are consequently well pleased with the results of the sale, in that it tends to establish a higher market for existing stocks of second-hand machinery.

Among the machine tool manufacturers no radical change has been experienced, nor is it expected immediately. But, taken as a whole, the business is better, and markedly so with machinery of more or less special character. Grinding machines, for example, are in much better demand, particularly those machines which are somewhat special. An excellent illustration of this is the Heald Machine Company, Worcester, Mass., which is running full time, on an increased equipment, with full force working on orders. Shipments for the five last months of the year amounted to three-quarters of total shipments for the full year from September, 1907, to September, 1908. A better illustration still is that during these five months shipments as compared with those of the "boom year" constitute the basis of a year's gain of close to 50 per cent. The company is finding a large field for its new cylinder grinder among the automobile manufacturers. The Norton Grinding Company, Worcester, reports a marked increase in orders for its heavy cylindrical grinders. Manufacturers of plain and universal grinders of the ordinary type are noting some improvement, though not as yet radical in character.

The New Haven Wire Bound Box Company, 175 East street, New Haven, Conn., has been organized to manufacture a patent wire bound box, with William Arthur as president and treasurer. A suitable building has been secured, and manufacturing will begin as soon as the equipment has been purchased. A good deal of woodworking machinery will be required, and orders for a small amount of it have been placed. The company is now planning to purchase ripsaws for ripping cleats, swing saws, pony planer, edging saws, double cut-off saws, matchers, printing presses, pulleys, shafting, belting, assembling benches, &c. The wire bound box has already been alluded to in this column. This is the twenty-eighth factory to be established to manufacture under the patents.

The American Envelope Machine Company, the incorporation of which was mentioned last week, has been organized with Ralph M. Grant, South Windsor, Conn., as president; Frank Grant, Westfield, Mass., secretary and treasurer, and Sidney A. Grant, Thompsonville, Conn., the third director. The company will put on the market a new machine for manufacturing envelopes entailing new principles. The company states that it will not establish works at the present time, but will have its machines built by contract, either in Hartford, Conn., or Boston.

The Parker Wire Goods Company, Worcester, Mass., has again extended its plant by taking more space in the building, the larger part of which it now occupies. The business of the company has grown steadily since it was established, more than six years ago, and the additional increase has become necessary for a general extension of manufacturing facilities.

The Perfected Self-Lighting Mantel Company, 120 Broadway, New York, has taken factory space in the Myrick Building, Springfield, Mass. The company states that it is in the market for one-half and one horse power electric motors, dipping machines, cotton burners and drying ovens, and that it wishes to hear from manufacturers of such equipment. A new self-lighting mantel and a line of plain mantels will be manufactured, and it is planned to employ 150 hands.

Sidebotham & Hambleton, East Lebanon, N. H., manufacturers of excelsior and bobbin stock and the Twentieth Century inside blind fastener, will rebuild the factory recently destroyed by fire as soon as the insurance is adjusted. The firm has just built a complete line of bobbin machinery which will have to be replaced as well as all other equipment, the loss, amounting to $10,000, being total.

The Rocky River Power Company is to petition the Connecticut Legislature for the right to erect dams across the Housatonic River in Litchfield County in the towns of Sharon and Cornwall, and to operate manufacturing plants in those towns from power generated at its hydraulic electric plants.

The Bridgeport Vehicle Company, Bridgeport, Conn., manufacturer of automobile bodies, has begun the erection of a three-story brick and steel factory, 88 x 160 ft., at Fairfield avenue and State street. The company states that it will be in the market for an engine, additional woodworking machinery and an elevator.

The Dunbar Bros.' Company, Bristol, Conn., manufacturer of springs, has begun work on the foundations of a new building which will be used as a machine room. It will be 25 x 48 ft. and two stories. The company reports that it is so rushed with orders that additional room is imperative.

The Success Mfg. Company, Gloucester, Mass., manufacturer of sheet metal goods, including steel ice chests and ash sifters, is building an addition, 40 x 60 ft., three stories.

The Whitin Machine Works, Whitinsville, Mass., manufacturer of textile machinery, is planning the erection of a new forge shop, which will probably be completed this season. No decision has been reached as to its details, but it will be modern in every respect and will require some new equipment, though it is too early to tell just what will be needed.

The Fay Welding & Mfg. Company has been organized in Massachusetts and will conduct a plant at 696 East First street, South Boston, where it will do autogenous welding of all kinds of metal, including cast iron and aluminum, by the Davis-Burnonville process. William F. McCarthy, Boston, is the president; Fred M. Fay, Chicopee Falls, Mass., treasurer, and Lawrence C. Fay, Chicopee Falls, clerk. Fred M. Fay will be the manager of the business.

In manufacturing other than metal lines, announcements of projected new industrial building are continually being made. The Converse Rubber Company, Malden, Mass., will erect a concrete addition, 60 x 150 ft., three stories, to manufacture 3000 pairs of rubber shoes daily. The Everett Mills, Lawrence, Mass., textiles, has issued $700,000 of new stock and will erect a new plant to employ 800 hands. Additions will be built to the plants of the McCallum Hosiery Company, Northampton, Mass.; Oxford Linen Mills, North Brookfield, Mass.; George Mabbet & Sons, woolen goods, Plymouth, Mass.; Hudson Worsted Company, Hudson, Mass.; Oxford Paper Company, Rumford, Maine; Russell Mfg. Company, Middletown, Conn.

Chicago Machinery Market.

CHICAGO, ILL., January 5, 1909.

A comparative view of conditions in the machinery trade at the beginning and at the close of 1908 affords a contrast quite as favorable to the later period as the course of events in the intervening time would warrant. The wave of reaction that followed the late panic swept the books of manufacturers and dealers almost clear of orders, through cancellations, and the year 1908 opened with a very feeble trade movement. There was plainly not much hope for a revival of business in tools and machinery until the manufacturing interests of the country should become more active. As opposed to the promising feature of the situation afforded by liberal production and high prices of farm products, there were the inertness of railroad purchasing departments and the depressing influences of an oncoming Presidential campaign. But for the sustaining power of the former forces, which were especially vigorous in the Middle West, trade in the territory tributary to Chicago would have suffered even more than it did; as it was, the volume of business in machine tools, as measured by the sales of the leading houses, had, at the opening of 1908, dwindled to 25 or 30 per cent. of what it was 12 months earlier. The character of orders indicated that purchases were being closely restricted to actual present necessities arising from the needs of replacement. Plans for expansion were generally suspended, and activities in this direction gave place to efforts to keep even a part of existing capacities engaged. In the Western States the tide of affairs bore less heavily, in a financial way, upon the smaller industrial concerns than upon those conducting large operations with great overhead expenses; and as a result the relative proportion of the machine tool business received from the small shops and factories was largely increased. Indeed, through the first six months of the year, and even beyond that time, the bulk of the orders came from such sources. Spurts of buying occurring intermittently throughout the year gave rise to hopes of permanent improvement, but in every case proved short lived and fell short of realization. Contrary to expectations, the month of December turned out to be one of the best of the year, and the fact that some of the more important buyers came into the market for moderate lines of equipment was construed as reflecting hopeful anticipations of better things in 1909.

One of the agreeable surprises of the past year was the remarkable vitality displayed in the automobile industry, which is now recognized by machine tool builders as affording a growing outlet for their product. It was reasoned that the effects of the depression following the money panic would sharply curtail the sale of automobiles, since they were regarded as more of a luxury than a necessity, and as such would bear the brunt of retrenchment economies. Despite these assumptions, not only have existing automobile plants been in full operation throughout the year, but quite a number have been compelled to enlarge and increase their output, in addition to which not a few new companies have entered the field. This unexpected development has, of course, contributed its quota of machinery business, which coming opportunely as it did was especially helpful.

The outlook for the coming year holds brighter prospects than were present a year ago. Very much, it is true, depends upon the future policy of the railroad interests of the country with respect to expenditures for material and equipment. The continuance of retrenchment practiced for the past 18 months would naturally handicap progress, but signs are not lacking that point to the raising of the embargo, to a considerable extent at least, in the near future. As far as the machine tool trade is concerned, it is after all not so much the actual requirements of the railroads themselves that are depended on to keep things moving as it is those of the many industries engaged in the manufacture of goods consumed by them. The possible effect of tariff revision, particularly as it relates to iron and steel schedules, is also to be considered in forecasting results; for if not directly affected machinery lines will feel, in a sympathetic way at least, whatever hesitation is caused elsewhere by the proposed tariff changes. But notwithstanding these contingencies, there seems to be good ground for the belief that the general trend will be upward. The most optimistic are not looking for a sudden boom in trade, but there is a deep rooted conviction that 1909 will develop larger prosperity for the machinery trade than its predecessor.

The Toledo & Ohio Central Railroad, Toledo, Ohio, is in the market for and expects to purchase the following list of shop tools for delivery at Bucyrus, Ohio, during the first six months of 1909: One No. 3 extra range heavy automobile car gaining machine, one No. 4 self-feeding rip saw, with counter shaft; one No. 221 automatic knife grinder, size 30 in.; one No. 231 saw gummer and sharpener machine, one 10-ft. Ferguson oil furnace, one No. 8 Sturtevant fan, two oil furnaces for bolts, one 80-in. Pond driving wheel lathe with double attachment, also journal turning attachment; one 48-in. planer, 12-ft. bed, two heads on cross rail and two heads parallel drive; one 2 x 42 in. Jones & Lamson turret lathe, with all attachments; one 16-in. Lodge & Shipley lathe, one set of bending rolls, ¾ in. by 10 ft. plates; one second-hand No. 7 Ajax bulldozer.

The Whiting Foundry Equipment Company, Harvey, Ill., has extended its sales connections by the appointment of the United Steel & Equipment Company, Seattle, Wash., as sales agent for Vancouver, B. C., Portland, Ore., and the State of Washington, and Gorman, Clancey & Grindley, Ltd., as sales agents for the Province of Alberta and the southeastern corner of British Columbia, for the sale of electric traveling and other types of cranes of its manufacture and general foundry equipment. Among the recent foundry equipment supplied by the company is that for the new plant of the American Car & Foundry Company, St. Louis, Mo., which includes wheel pits, pitting trolleys, electric pulley machines, transfer car for core oven, floor cranes, reservoir ladles and teapot spout wheel pouring ladles.

Foundations are being put in by the Washington Iron Works, Seattle, Wash., for a new boiler shop and an additional foundry building. Work upon the superstructures, however, will not be started before next spring. The proposed extensions, which include other alterations in the plant, will require an expenditure of about $60,000.

E. C. Roberts & Sons, Miles City, Mont., are arranging to open a machine shop in that city within the next 60 days, to do general repair work and handle gas engines and automobile supplies. Machinery for the shop equipment is now being purchased.

Cleveland Machinery Market.

CLEVELAND, OHIO, January 5, 1909.

While the past week has been a rather quiet one with the local machine tool dealers, they did more business than they expected in the closing days of the year and a holiday week. Some of the machinery houses report that their December sales were the largest of any month during the year. Others did about as much business during December as in their best previous months of the year and they regard this showing as very satisfactory, considering the fact that December is usually one of the poorest months of the year in the machine tool trade. The demand was very good during the first half of the month, and while the last two weeks were quieter, orders kept up fairly well and inquiries have continued to come in in a satisfactory volume.

Machinery houses now have on hand many inquiries that have come in during the past month which have not yet resulted in the placing of orders, but considerable business is expected to come from these inquiries during the present month. Dealers are looking for a quiet spell for the next week or two, but they expect a good volume of orders to come out during the latter part of the month and the feeling regarding the business outlook for the year is quite optimistic. While large inquiries are scarce, the prospective buyers now include some of the larger manufacturing concerns that have been out of the market during the past year. The inquiries are coming from all kinds of manufacturing plants for all kinds of tools, in large as well as in small and medium sizes. A large share of the inquiries are for two, three or more tools to replace old equipment or to increase the capacity of the plants. There is a fair demand for second-

hand tools and the small supply that is being placed in dealers' hands is moving freely.

With tool manufacturers business has been somewhat quiet during the past week, but nearly all report an improvement in inquiries and the outlook good for a fair volume of orders before the end of the month.

The Strong, Carlisle & Hammond Company, machinery and supplies, Cleveland, will in a few days open a branch office, demonstration room and machinery display store in Detroit. The company will be located at 44 Congress street, East, in that city. The office and storeroom will be in charge of H. H. Boggs as manager, who for some time has represented the company in the Michigan territory.

The Johnson & Jennings Company, Cleveland, iron founder, engineer and machinist, on January 1 took over the business and plant of the American Machine & Mfg. Company and will continue the business of the latter company in connection with its own under the name of the Johnson & Jennings Company. The two plants adjoin and both have been operated by practically the same interests.

Cleveland machinery houses are figuring on a revised machine tool list from the Buckeye Steel Castings Company, Columbus, Ohio. This company has an inquiry out for about 20 tools, including lathes, shapers, drill presses, &c. It is expected that the order will be placed soon.

The Massillon Rolling Mill Company, which is erecting a new plant in Massillon, Ohio, has its structural work under cover and expects to have the plant in operation about March 1. Its product will be black and galvanized sheets. The man most actively interested in the new company is A. B. Clark of the Canton Art Metal Company.

The plant of the Toledo Stove & Range Company, Toledo, Ohio, is to be enlarged by the erection of a two-story addition, 85 x 190 ft., to the gas range department.

The Toledo Screen Company, Toledo, Ohio, has been incorporated, with a capitalization of $100,000, by A. J. Cone and others. The new company has purchased from the William Peter estate a large screen factory located in Toledo.

The Buckeye Engine Company, Salem, Ohio, has had enough orders on hand to keep its plant running night and day since September 15, and reports the business outlook for this year very satisfactory.

The Jewel Motor Car Company, Massillon, Ohio, has been incorporated, with a capitalization of $250,000, by W. A. Croxton, president of the Massillon Iron & Steel Company, and others. The new company will take over the plant of the Forest City Motor Company.

Cincinnati Machinery Market.

CINCINNATI, OHIO, January 5, 1909.

While nothing significant has happened during the week in the way of any volume of new business and the customary holiday dullness has been none the less pronounced, there has been considerable doing in the way of plans for the year which is calculated to greatly influence both manufacture and output of machinery and machine tools. As many as a half dozen changes of importance, and all looking to the betterment and enlargement of facilities, with three or four actually new establishments in the iron and steel producing and handling line, are in process of building or furnishing. Machine tool manufacturers who have given the subject careful study estimate that the decrease in volume of business of the year in tool lines will average about 33 1-3 per cent., taking the figures of the entire year of 1907 as the basis. But all anticipate a good year for 1909 and the most of them are preparing accordingly. The dealers give very encouraging reports to the manufacturers in this field, and much of the prevailing optimism manifested among tool makers generally is due to the encouragement of the machinery salesmen who have had time and opportunity since election to follow up all the signs and investigate conditions in various industrial sections which furnish the business in tools and allied lines.

Tool manufacturers are all well prepared for the expected revival; practically all took the opportunity offered during the year for a careful and businesslike inspection of their facilities and strengthened weak spots here and there. This was hardly possible during 1906 and the greater part of 1907, when the official duties were so heavy attending to necessary correspondence and trying to conciliate buyers who urged deliveries that were physically impossible to make, and while the working forces were speeded to the limits of their ability.

One of the first to announce his plans in the new year is M. L. Andrew of M. L. Andrew & Co., manufacturers of special machinery, at 2850 Spring Grove avenue. Mr. Andrew has purchased property at the southwest corner of Colerain avenue and Alabama street, on which a new factory building is to be erected. The building will be two stories, 40 x 160 ft. Plans are now in preparation and the intention is to rush the construction as rapidly as practicable. The firm will enlarge its output, adding a line of heavy multiple iron drills and multiple wood borers designed especially for car and general railroad work.

Another of the new institutions of the new year which starts out with splendid prospects, its success assured from the financial and moral support guaranteed by many of the large toolmaking establishments, is the Cincinnati Steel Foundry Company, which has just been incorporated for $50,000 and announced to be all taken this week. The new company will occupy the old L. Jones & Son foundry on Kenyon avenue, operated for many years by Salmon P. Jones, his father, L. Jones, and John J. Bruce as a gray iron foundry. The place has been idle since last May, when Mr. Bruce moved into his new establishment on Colerain avenue. The incorporators are William Gilbert, John L. Hopper, Salmon P. Jones and John E. Bruce. The practical man of the company and who will doubtless also be president is Mr. Hopper, who was formerly with the Washburn Steel Company of Minneapolis and other large concerns in various special capacities. Mr. Hopper is an expert on steel making, and the specialty of the new company will be small crucible steel castings, ranging from 1 to 200 lb., designed for the tool manufacturers who have hitherto had to buy these largely from the East. Later it is expected to add a line of railroad supplies, such as oil cups, hammers, wrenches and the like.

It is difficult to confirm statements appearing in the Louisville daily press saying that a number of wealthy manufacturers of Chicago, Cincinnati and Pittsburgh will capitalize a company at $500,000, one-third of which has been subscribed, to reorganize the old Louisville Bolt Works in that city, which has been idle for three years, and install machinery for the making of sheet iron and steel. Nothing of the matter can be learned here. William Fetzer of Middletown about a year ago was credited with the purchase of the old plant, and he is said to be conspicuous in the details of the organization. George D. Todd of the Todd Mfg. Company, New Albany, and George H. Holzbog are also named as especially prominent in the new company.

Commissioner Robert Wuest of the National Metal Trades Association, who has been in Cuba and the South for several weeks, is at his desk again. He is quite pleased with the year's record, recalling that of 113 strikes fought 109 were won and 13 shut off in their incipiency.

The Ft. Wayne Rolling Mills, Ft. Wayne, Ind., is increasing time and forces and has enlarged the scope of manufacture by increasing the line of bar iron shapes, which has hitherto been confined to round and square bars.

Officials of the American Steel Wheel Company at Alexandria, Ind., are reported to be quite pleased with the outlook in their line, which is the manufacture of a steel tubing for use in wagon wheels. The special machinery required has just been installed and work has begun in all departments.

Tool makers generally are interested in the report that the Big Four Railroad is greatly enlarging the capacity of its Bellefontaine, Ohio, shops, which is to be made a terminal point. It is reported that the smaller shops at Sandusky, Springfield and Delaware will be removed to Bellefontaine.

Philadelphia Machinery Market.

PHILADELPHIA, PA., January 5, 1909.

The trade has been giving the bulk of its attention to affairs connected with the closing of the year's business. Plants have been shut down over the holidays, minor repairs have been made and manufacturing and industrial establishments are being placed in shape for another year's campaign. Statistics regarding the volume of business transacted in the different branches of the trade are not yet available, but few are expected to show much of a balance on the profit side. With industrial plants being operated on greatly reduced outputs, plant extension and new enterprises at a minimum and the railroads practically nonbuyers, the machine tool trade's source of business has been greatly reduced; and, while the situation at the close of the year shows a decided upward movement, it will nevertheless require a considerably larger volume of business to get the full capacity of shops and plants occupied, until which time there is little likelihood of heavy buying either for replacement or plant extension.

The immediate disturbing factor of the trade, the tariff agitation, will no doubt retard business in some lines to a certain exent, but the trade on the whole feels much encouraged as far as general business is concerned. It is believed that, while there will be some restrictions on an early strong resumption of business, before the first half of the year has passed the trade will be on a much more satisfactory basis all around.

Transactions during the week have been of an extremely light character. Scattered sales of small tools have been reported, transactions of any magnitude still being deferred as a rule. Some little business of a special character has come out, but even in these lines trade has been along narrow lines. Inquiries have been light in practically every line.

Inquiries for tools for export are few, and the trade doing an established trade abroad reports the usual year end dullness.

Frank C. Roberts & Co., engineers, state that plans for the new Curtis Publishing Company's building, Sixth, Seventh, Walnut and Sansom streets, will be completed in a few weeks, and will then be ready for estimates. This firm has also been commissioned to make plans for an addition measuring 22 x 159 ft. on the ground plan to the building of the Real Estate Trust Company, Broad and Chestnut streets.

The Western Maryland Railroad plans to spend about $1,250,000 for equipment the coming year. Five hundred steel hopper cars and a number of locomotives will be added to the company's rolling stock, the receiver of the road having been authorized to purchase equipment amounting to nearly $636,000.

The tunnel project under the Delaware River, between Philadelphia and Camden, is moving forward in satisfactory shape. Councils of this city have passed an ordinance granting the company rights and privileges on this side of the river, one of the stipulations of which is that actual work must be started one year after the date the contract has been entered into. An ordinance of the same nature as that passed in this city is now before the council of Camden and will be acted upon at an early date. The general disposition seems to be to give the promoters of this project every legitimate opportunity to go ahead with the work.

The Royalton & Elizabethtown Street Railway Company will begin the construction of an electric railroad in the spring, connecting Middletown, Florin, Royalton, Elizabethtown and Mount Joy, Pa., a distance of about 40 miles. A branch line will also be built to Lebanon. Power is to be furnished from a station to be erected at Conewago, while repair shops will be located at Elizabethtown, Pa.

Government Purchases.

WASHINGTON, D. C., January 5, 1909.

The following bids were opened December 29 for machinery for the navy yards:

Class 41.—Three steam locomotive cranes—Bidder 6, American Hoist & Derrick Company, St. Paul, Minn., $7273; 13, Browning Engineering Company, Cleveland, Ohio, $7200, $7800 and $8500; 18, Brown Hoisting Machinery Company, Cleveland, Ohio, $8860; 44, G. & W. Mfg. Company, New York, $8447; 64, Interstate Engineering Company, Bedford, Ohio, $6700; 65, Industrial Works, Bay City, Mich., $7285.

Class 131.—One motor driven turret lathe—Bidder 39, Walter H. Foster Company, New York, $3630; 95, Niles-Bement-Pond Company, New York, $4618.

Class 151.—One motor generator set—Bidder 38, Fort Wayne Electric Company, Fort Wayne, Ind., $3077 and $2972; 48, General Electric Company, Schenectady, N. Y., $3456; 127, Western Electric Company, New York, $3723; 128, Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., $3524.

The following bids were opened October 13 by the Light House Inspector, Chicago, Ill., for 10 marine gasoline engines:

Racine Boat Mfg. Company, Muskegon, Mich., $2150, accepted; Truscott Boat Mfg. Company, St. Joseph, Mich., $2275; Richards & Friauf, Chicago, Ill., $2275; Bullock-Walt Company, Chicago, Ill., $2640 and $1519.50; Kahlenberg Bros., Two Rivers, Wis., $3000; Green Bay Machine Company, Green Bay, Wis., $3050.

The following bids were received November 23 by the Light House Inspector, Detroit, Mich., for one 15-hp. four cylinder gasoline motor for the launch of the tender Marigold:

Buffalo Gasoline Motor Company, Detroit, Mich., $739, accepted; Lamont & Steers Engine Company, Detroit, Mich., $1000; F. A. Brownell Motor Company, $1044.57.

Under bids opened December 14, Circular No. 481, for machinery for the Isthmian Canal Commission, the C. H. Wheeler Mfg. Company, Philadelphia, Pa., has been awarded class 2, one surface condenser, with air and circulating pumps, $3208.

The following awards have been made for machinery for the navy yards, bids for which were opened December 1:

Manning, Maxwell & Moore, New York, class 31, one back-geared crank pillar shaper, $475; class 32, one single head back-geared traverse shaper, $1660.

Walter H. Foster Company, New York, class 33, one universal shaping machine, $504.50.

Under bids opened November 24 for machinery for the navy yards, Henshaw, Bulkley & Co., San Francisco, Cal., have been awarded class 21, one pole and manhole punch, $2245.

The following awards have been made for machinery for the navy yards, bids for which were opened November 17:

Manning, Maxwell & Moore, New York, class 121, one power feed drill press, $440; class 124, one No. 2 universal milling machine, $1280.

Fairbanks Company, New York, class 126, one shaper, $996; class 127, one motor driven shaper, $768.

Under bids opened November 10 for machinery for the navy yards, the Lehner Engineering Company, New York, has been awarded class 71, one double cylinder reversible link motion hoisting engine, $1125.

Under bids opened October 20 for machinery for the navy yards, Harron, Ricard & McCone, San Francisco, Cal., have been awarded class 13, one belt driven floor grinder and one motor driven floor grinder, $440.

Under bids opened October 22, Circular No. 471, for machinery for the Isthmian Canal Commission, the National Electrical Supply Company, Washington, D. C., has been awarded class 3, 40 duplex horizontal oil pumps, $2461.50.

Youngstown Sheet & Tube Company Improvements.

The rod mill of the Youngstown Sheet & Tube Company at Struthers, Ohio, was shut down in the latter part of December for four weeks, during which time a new 2500-hp. Tod-Corliss horizontal vertical engine of the latest improved pattern will be installed, to replace a small Tod engine that was furnished by the William Tod Company to the Morgan Spring Company. During the shutdown of the rod mill, the balance of the works will be operated to such capacity as orders may warrant, the output of the plant being barb wire, wire nails, smooth steel wires and staples. During the shutdown for the making of improvements in the rod mill there will also be installed in the new addition just nearing completion other machinery which will materially increase the capacity and facilities of the plant for making all kinds of wire products. The first unit of the new galvanizing plant will be completed about February 1. The rod mill in the new system now being inaugurated will work double strand, doubling the capacity. These improvements will make the rod mill entirely modern and able to handle a very large output.

The directors of the company have recommended to the stockholders that the capital stock be increased from $6,000,000 to $10,000,000, the recommendation providing for a stock dividend of $3,000,000 out of the surplus and that $1,000,000 be paid in in cash, to be used to increase the working capital. Some improvements and additions to the Youngstown plant are contemplated, but the nature of these has not as yet been fully decided. It is probable that the company will build this year two more blast furnaces at Youngstown. The two furnaces recently put in operation do not provide enough metal for the Bessemer plant, which uses 1500 tons per day.

The Clark Steel Hoop Company Starts Operations.

The new plant of the Clark Steel Hoop Company at Punxsutawney, Pa., was started December 28, although actual operations were not really commenced until December 31. Work was begun on the construction of this new plant July 28, 1908. The initial run was made without a hitch of any kind. There are seven buildings in the group, consisting of a rolling mill, 50 x 75 ft., with an L-shaped extension, 20 x 90 ft., boiler house, lathe and shear house, warehouse, stockhouse, supply building and office. The rolling mill is equipped with a Belgian train and a 2-ton billet heating furnace. There are four sets of rolls, including the finishing rolls. All kinds of steel hoops, bands and light shapes from ⅜ to 3 in. in width can be rolled, and from 3-16 in. down to the smallest gauge in thickness. The new plant has a daily capacity of 75 tons.

F. L. Clark is president and general manager of the company, and will personally have charge of the supervision of the plant. The company is capitalized at $60,000, and is controlled by Pittsburgh and Punxsutawney capitalists.

The Crane-Best Company, Chicago, has placed a contract with H. L. Kreusler & Co., contracting engineers, Pittsburgh, for the erection at Verona, Pa., of a foundry building, 175 x 323 ft.; a machine shop, 129 x 368 ft., two stories, and a shipping room, 64 x 129 ft. The buildings will be of steel frame, brick and reinforced concrete construction, and will be modern in every way. They will require about 2600 tons of steel, of which 900 tons have been placed with the Riter-Conley Mfg. Company and 1700 tons with the American Bridge Company.

HARDWARE

THE merchants of the country have been very generally in favor of laws to protect them and the public from inferior goods and to prevent false labeling, misleading advertisements and other forms of deception. There has been a disposition to welcome legislation thus aiming directly at the correction of existing evils. It has been looked upon as a short and easy way of putting a stop to or of escaping from troublesome and injurious practices, and in the interest of trade morality. These laws are most frequently regarded as bearing upon the methods of the manufacturers, when, in matter of fact, they in many cases relate directly to the merchants, wholesale and retail, who handle the products in question. As things are shaping themselves in these days when so many legal remedies are put in force, it is proper that the distributers as well as the makers of articles or commodities be careful that they do their part in carrying out the laws, and in seeing that they do not themselves become lawbreakers.

Statutes are now in effect in several States providing substantially that persons dealing at retail in Gasoline, Benzine or Naphtha shall deliver these fluids to the purchaser only in barrels, casks, packages or cans painted red, having the word "Gasoline," "Benzine" or "Naphtha" plainly stenciled thereon; with the further provision that Kerosene shall not be delivered in receptacles so colored and stenciled. The law indeed goes further in its protection, as it stipulates that persons purchasing these dangerous fluids shall keep them in such a receptacle as has been described but shall not keep Kerosene in a similar receptacle. It is made the duty of a State official to enforce the law, and penalties are fixed for its nonobservance. Notwithstanding the clearness of the statute it is commonly reported that these requirements of the law are frequently ignored, and that some merchants in the State where the laws are in force are not aware of their existence.

In many, perhaps all the States, there are laws protecting the public against fraud in weights and measures. The substance of the law is that the marking or stamping of false or short weight or tare on any cask or package, or the selling or offering for sale of any cask or package so marked is a misdemeanor. In this view of the case it behooves merchants to see to it that their Wire Picture Cord is correctly marked as to length, and that the contents of their packages of Tacks bear out the statements on the labels. In some of the States certainly this principle is strictly construed, and the net and not the gross weight is to be on the individual package; thus a pound of Tacks must be a pound net, and not a pound including the Tacks and the box containing them.

This is not a matter merely of theory, but becomes very practical when the penalties of the law are unexpectedly enforced. Not long since a Western merchant was brought up with a short turn because he had in his store adulterated Linseed Oil, the sale of which is prohibited in his State. He was fined $15. In a similar way a prominent merchant in the East, a man of high character and recognized position, was called to account for selling short length goods, and confronted with the probability of serious fines being imposed and a possibility of imprisonment, as guilty of a misdemeanor. In this condition of things, with general statutes which have been ignored and are perhaps forgotten, but which are liable to be brought out from their hiding place suddenly and in a very uncomfortable fashion to re-enforce recently enacted laws, it is incumbent on merchants and manufacturers to take care what they are doing. The examination of a Hardware stock in view of these principles and facts would bring up some interesting questions and doubtless afford ground for reflection. This is an era of law and legal enactments, applying not only to railroads and great corporations, but to distributors, large and small.

Condition of Trade.

It is too early after the opening of the year for the setting in of an animated demand or a development of specially new conditions. The first of January has frequently been a time when manufacturers announced revisions of their prices, but of late there has not been as much of this as formerly, and the present year the changes are comparatively few. The process of revising prices was carried on pretty continuously during the past year, as evidenced in the review of the Hardware market given in the following pages. From this it will be seen that the year witnessed an unusual number of changes and not a little movement in the direction of lower values on many goods, with, however, some higher quotations on others to counterbalance them. The pricing of the inventory this year will call for care and good judgment. The shrinkage in values will count, of course, against the profits of the year, but the reductions have not been in many cases radical, so that it may be hoped that they will not count too heavily against a satisfactory outcome for the year's work. The diminished volume of business during 1908, with which many must reckon, is doubtless a more serious matter. In some cases where the merchants succeeded in keeping the volume of business up to that of the preceding year this was accomplished only by extraordinary efforts, involving an increased expense, so that the proportionate cost of doing business was above the normal. The manufacturers who did not find the aggregate of their sales in 1908 considerably less than in 1907 are doubtless very few. The trade are leaving behind them a year in which the carrying on of business has been attended by peculiar difficulties, but with the result, it appears, of getting things, commercial and financial, in better shape and in readiness for a more easy and normal movement of merchandise. The market is still in a condition which calls for conservatism in contracting for raw material and finished products, and the disposition of both merchants and manufacturers is evidently to avoid purchasing beyond their early requirements. But whatever may be the influences which temporarily affect the market the fact that the people are well to do and that a continued development in wealth and prosperity is to be expected as the good fortune of the country in view of its great resources and splendid enterprise are considerations which give confidence and hopefulness at the opening of the year.

Chicago.

While the final results of last year's business have not, as a rule, been reduced to the concrete terms of balance sheet statements, enough is known to give assurance that the Hardware interests of the Middle West will for the most part find the balance on the right side. In any case attention is more generally directed now toward the future outlook than to retrospection. It is conceded on every hand that the prospects are far more encouraging than they were a year ago, and moreover, the actual volume of business moving is greater than it was at that time. Jobbers and manufacturers are gleaning a good deal of information concerning conditions in various parts of the country from salesmen now in for the double purpose of posting up and enjoying the holiday vacation. In this way it is learned that retail stocks all over the country are still considerably below normal in volume. Primarily the reduction in stocks was due to tightness of money and the caution that guarded against the taking of unnecessary risks; but the continuance of this policy long after the causes which gave it rise had disappeared, is ascribed to the promptness with which goods are now supplied from the mills, and the lack of speculative inducements offered in prospective advances of prices. The demand for Wire and Wire products held up well through December; better, indeed, than was expected, and even with all the outside selling forces now inactive, quite a good volume of business was entered last week. By the middle of the month, when all interests have settled back to work again, there will be less of conjecture and more definite knowledge as to what may be expected in the way of early improvement than we have at this time.

St. Louis.

NORVELL-SHAPLEIGH HARDWARE COMPANY.—The two things which of course stand out most distinctly in reviewing the year 1908 are, first, the aftermath of the panic in the early part of the year and the national election in the latter part.

The panic was most severely felt in the manufacturing, mining and railroad towns. In many agricultural districts merchants have enjoyed a very satisfactory trade. They would never have known there was a panic but for the reports in the daily press.

In summing up the work of our salesmen it is surprising to see how many of them show increases in sales in 1908 over 1907. Texas and Louisiana in particular and the cotton growing States in general seem to have suffered a greater depression than those States raising corn and wheat.

In the last four months of the year—September, October, November and December—we have shown gratifying gains over last year. December was one of the best months of the entire year. With the exception of one month—February—we suffered losses in sales the first eight months of the year. Our gain in February was the result of many future shipments going out that month which the year before were shipped in March.

Taking the year as a whole we are glad to say in sales we will show a very small falling off as compared with the year before, but the percentage of our decrease will be greater in profits than in sales.

At the beginning of 1908, instead of reducing our force of salesmen and cutting down our house force, we decided upon the opposite policy. We therefore considerably increased the number of our salesmen, opened new territories, worked old territories closer and maintained our house organization. It took some courage to adopt this policy at the beginning of the year in the face of panic conditions. We also decided to buy goods and to keep our stock complete, and to do our best to make a record in filling orders without shortages. Now at the close of the year we have the satisfaction of feeling we did not adopt an unwise policy.

Andrew Carnegie stated that organization is the business. We believed one of the greatest dangers of the panic would be the breaking up of business organizations. We therefore feel thankful we have been in position to maintain ours and to come through the panic better and stronger than before.

The blowing of our own trumpet in this manner may subject us to criticism, but we feel it took a good deal of nerve on our part to plan the year's campaign as we did. It took more nerve and a good deal of money to carry out the campaign. Therefore, in looking back over such a hard year as 1908 our critics should excuse us if we are just human enough to draw some satisfaction from these facts.

A striking feature pertaining to prices throughout the year has been in the fact that they have, generally speaking, been so well maintained. The large interests in the steel trade deserve special credit for their part in steadying the market and in preventing a general stampede and demoralization of prices by timid manufacturers and jobbers.

Throughout the year there have been many discussions and papers written on the financial system of the country, but so far we see no practical results coming from these discussions. It does seem our banking system is not adequate to the needs of the country, and unless important changes beyond a compromise measure are introduced we can look forward to similar financial panics in the future.

The election came off on schedule time, and we have no doubt a majority of the voters of the country are satisfied with the result. Among the business interests there is a widespread feeling of confidence in Judge Taft. It is now generally believed he is in earnest in his desire to continue the Roosevelt policies. It is still further believed while his work may not be quite as spectacular as that of his predecessor in office, it will be none the less effective.

Recent evidence given by Andrew Carnegie before the Tariff Revision Committee has attracted the attention of the entire country. Some people express wonder at Mr. Carnegie's views on the tariff situation. The question is often asked, "Why does he express himself so forcefully in regard to the necessity of a reduction in the tariff?" The answer that seems most plausible to us is that Mr. Carnegie has reached the point in his development where he cares nothing whatever for wealth and is simply trying his best to tell the truth as he sees it for the good of the country. There is an old saying to the effect that truth is frequently more surprising than fiction.

Mr. Carnegie's statement that the United States Steel Corporation made a net profit of $15.50 per ton on every ton of merchandise they manufactured is interesting. If this statement is true of Nails and Wire it means manufacturers of Nails and Wire are to-day making net 75 cents per hundred on these goods. When the jobbers and retailers compare their gross profits with these figures they will doubtless have something to think about. Most jobbers and retailers sell Nails and Wire without sufficient profit to cover the cost of doing business; in other words, they distribute the goods for nothing.

In the latter part of 1907 and the early part of 1908 retail merchants were exceedingly conservative in buying goods for future shipment. We are glad to report that this year one of the most cheering signs of the times is in the fact that the retail trade have bought goods for future shipment without hesitation, and already a large proportion of their purchases of spring lines have been made.

The business of the early part of the year depends very largely upon the character of the weather. We have many times said spring business is made by the weather, fall business by the character of the crops. If we have favorable weather we look forward to a very heavy spring business. Most manufacturers have been conservative. Comparatively few have had the necessary capital to make up and accommulate large stocks. We believe on many lines of goods there will be shortages this spring.

We therefore recommend to our retail friends that in the usually dull months of January and February they place their orders and get their stocks well sorted up and ready for the spring demand. We believe the wise merchant will utilize his time in January and February buying his goods and getting his stock into the best possible condition for a good spring business. It does seem unwise for the merchant and his clerks to waste their

time loafing in January and February and then when the heavy demand comes upon them in March and April to be short of goods and hardly have time to buy them, much less to open them up and put them on the shelves. Every merchant knows in a general way what he will need, and it certainly seems the part of wisdom to utilize the dull months in this manner instead of wasting these days of opportunity.

On visits East we have found business conditions quite different from those in the West. Some of our Eastern manufacturing friends still seem to be somewhat pessimistic. We therefore are glad that we feel justified by the conditions we see around us to cheer them up by promising them there is going to be very good trade in the Central West the coming spring.

But after all, we believe that in good times and bad the Hardware merchant, either wholesale or retail, should buy goods just as he needs them. He should be governed by the conditions surrounding his own business, regardless of newspaper articles. We find in reading Mr. Carnegie's writings he has constantly given this advice to merchants—to buy their supplies as they needed them regardless of the fluctuations in the market. He did not believe in speculative buying, and we have no doubt he agrees with us in three principles of buying:

First, and most important, to have goods when they are wanted.

Second, not to have them when they are out of season.

Third, to get the extra 5 when we can.

We wish *The Iron Age* and all the trade a happy and prosperous New Year.

Louisville.

BELKNAP HARDWARE & MFG. COMPANY.—The advent of the New Year is marked by a prevalence of optimism. Nearly every one you meet looks as though his meals had been particularly square and as numerous as the law allows. This, by the way, might be cited as a case where the square plug is made to fit into a round hole, assuming that the human æsophagus is as portrayed by the highly colored prints in our doctor's office. There seems to be absolutely no apprehension of the future, not even of tariff disturbances. The seismic instruments which naturally would give us premonitions of serious upheavals in Washington, are not more than usually active. Possibly the complex nature of the question itself, involving infinite detail, is felt by the protectionist as constituting a safeguard against radical changes. But certainly both parties are committed to some change, so it would be hardly good faith not to undertake revision seriously.

Notwithstanding the drought throughout the whole central country, the products of field and farm in 1908 were large, and the figures at which these were sold have been high, so that the farmer is extremely well off. He may not know it, but the condition of the interior banks shows that he is a man of means and able to pay his bills as he never was before. Wherever the roads invite motoring possibilities, it is not hard to induce him to buy an automobile. The mere fact that live stock is such an unfailing consumer of corn, oats, and hay at their present high prices is one reason for transferring the farmers' affections to the runabout and motor car. At least, these do not call for food, water, currying and shoeing, &c., while unable in bad weather to do more than stand in the stall, and draw upon our pity. As soon as the diffidence is worked off, which the farmer feels at being classed among the plutocrats, by the very reason of having an auto, we shall see many more of them. There is just a little reproach still lingering in the possession of anything so citified and wealthy looking as a road machine, to say nothing of the effect on the assessor and tax gatherer.

The holidays have been used as a time for bringing in the traveling men and having conferences with them, while customers were taking an account of stock. The Hardware houses here adopted this plan, one alone bringing in not less than 100 men. The enthusiasm got from the mere exhibition of the numbers of those who spend their time upon the firing line is not wasted, either upon the men themselves or upon those of the house whose duties are less exciting in their daily routine. The one marked feature is the effort to secure more uniformity of handling the business, so that those who deal with the documents in their various forms shall be able to pass as many as possible through to completion in the course of the day.

Just what forms shall be used are largely a matter of experience with each house. One of your correspondents not long since gave us a most humorous account of the effect of the systematizer upon the office. How these gentlemen flourished for a short time! their employment being based upon the fears in the breast of some jobber or manufacturer lest his competitor had discovered the philosopher's stone, while home folks did not know the secret. No fee seemed to be too extravagant to ask, and at the end, in the final analysis as the current phrase puts it, it was discovered that the true philosopher's stone was to do your own thinking and to make the most of your opportunities. These gentlemen of the multiform printed sheets have about disappeared. The efficiency during the past year or two of the heads of the establishment has been increased as well as of the subordinates. The artificial accessories have been permitted to lapse, and we have passed on to some new thing more lucrative than distorted bookkeeping.

As we look back on the frame of mind with which we were obliged to welcome 1908, we are very thankful that a change has come over the spirit of our dreams. We believe we are more practical by reason of the hard turndown a year ago. The banks will let us have money on our own checks and the money lender is abroad with outstretched hand. The writer is still of the opinion which he has expressed before, that during the period of marked prosperity, say the past five or six years up to 1907, inclusive, the pressing wants of the farmer and general buyer had been provided for. We have got either to find new buyers or encourage new lines of wants, something that will answer as a money letter or safety valve, if business is to be very largely expanded. We must get the benefit of increased population, and then we must put in pianos and pianolas in place of harmonicas and accordeons.

The most advanced step in the encouragement of thrift and saving has been made by the Massachusetts savings banks, which have added insurance and annuity features under the authority of the State to their other functions. This insurance being done without the expense of solicitors is cheap and will form a desirable substitute for the old age pensions. England is wrestling with this form of pensions, and the results will be watched with extreme interest. It will be an unfortunate day when we undertake to do away with the idea of filial duty, thrift and saving, and encouraging the spending of every dollar as fast as it is acquired.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—In the opening of this letter we desire to extend to *The Iron Age* the wish for a Happy New Year. When this letter reaches you and goes before the readers, the retail merchants, jobbers and manufacturers, as well as outside buyers, we will have entered the year 1909, and we extend this same wish for a Happy New Year to all.

It is difficult to state positively what will be the general improvement in the year 1909. We, however, can safely say that at the close of the past year there was considerable increase in trade over the crisis which began in 1907 but did not, however, extend very much to general trade before January, 1908. The crisis referred to was not alone in our own country, but extended largely to several foreign countries. Our imports were not far from $300,000,000 less than the previous year and our exports some $150,000,000 less, but the advantage of exports over imports was some $600,000,000, which of course is a great advantage to our country. The farm products of our country, according to the estimate of the Department of Agriculture, were exceedingly large, and the cotton crop was also large, which of course was also a great advantage to the country.

Now, the crisis of the past year was due to financial

trouble. This caused quite a number of manufacturers to close their works, and this of course reduced the number of employees, many of whom have now been reinstated, and the business of both banks and trust companies has largely improved; therefore, the year opens with a hopeful outlook.

Tariff matters are now before Congressional committees, but we feel that there should be no scare over these important matters. There can no doubt be some reduction in tariff rates without affecting manufacturers or trade generally because many goods are now manufactured here at far less cost in manufacturing than they were when the present rates of tariff were adopted. Present investigations now being made show plainly the truth of this statement. Andrew Carnegie has made statements as well as suggestions as published by the daily papers. One of the papers we have read says: "Is it not true that you and we always have based our chief argument for protection upon the solid ground that we wish only to protect an industry until it becomes strong enough to stand against foreign competitors." And, further, "For our part we agree with Mr. Carnegie that the removal of the tariff from a protected article when it no longer needs protection is complete proof that a protective tariff is wise and just."

There are several other lines of manufactured articles which have not come before the committee at the present time so far as we know. On one line that we could name quite an advance was made in the selling price, but a change in tariff would not reduce the price, because these goods are manufactured so much more cheaply now than they were when the tariff went into effect. We refer to the above in the manner that we have because many persons are a little fearful of a reduction in the price of goods when the tariffs have been rearranged.

There is one quite important matter which has been before Congress for a couple of seasons, and which will again be presented early this year, and which, unfortunately, has the strong recommendation of the Postmaster General. We refer to the parcel post. There are two reasons why this should be defeated. One is the reduction last year of the income to some $17,000,000 less than the actual cost, owing to the condition of this bureau, whereas if no peculiar conditions had existed the 1 cent letter postage demanded by many important organizations could have been adopted without loss to the Government. It will be seen if parcel post, as suggested, be established, it will be a further loss to the Government and a great disadvantage to the general trade throughout the country. It will mean the wiping out of many of the retail merchants in the country villages and towns. This matter has been taken up not only by the National Hardware Association, the Hardware Manufacturers' Association of the United States, and the retail trade of the country, but by the many retail Hardware associations in the various States, as well as by dealers and jobbers of other goods, who look upon this as being very dangerous to the retail trade of the United States, as well as to jobbers and manufacturers and would be a menace to the prosperity of small cities, towns and villages. The feeling against the project is very strong, and we certainly hope Congress will oppose the proposition of the Postmaster General, and will turn the matter entirely down. If this is not done we feel that it would sweep away the profits of many millions of our population, and after last year's crisis this is certainly a bad time for our Government to take up anything that would be a disadvantage to millions of persons engaged in trade.

The terrible earthquake which occurred last week in the cities and towns of lower Italy and Sicily was one of the most terrible that ever occurred. Sympathy has extended to not only this country but foreign countries, and no doubt a large amount of money will go to their assistance and relief.

We ended the taking of stock the day before the first of January, and no doubt this has extended to not only other jobbers, but to manufacturers and we judge to the retail trade. The general results of the business year will, however, require a few days before they can be determined.

A large number of our salesmen were at home for a few days before January 1, and the writer personally took great pleasure in a consultation with them one entire morning the last day of the year, and we are glad to see that salesmen feel hopeful regarding the opening of trade soon after January 4.

Portland, Oregon.

FAILING-MCCALMAN COMPANY.—The writer can only say in looking back over the past year that as far as the Pacific Northwest is concerned business in all lines of Hardware has been far and away better than we ever hoped for a year ago. All our producing interests have had especially good times, excepting only the lumbermen, and in consequence, we who are dependent so greatly on the prosperity of all producers for our own prosperity, have had a good year.

We must say that we believe the recent depression was in many ways the best thing that could have happened, both for jobbers and retailers, as it has waked a good many of us up to serious weakness which we can now guard against.

In regard to the new year, which will open before this is published, as always, the writer is optimistic, and even more justifiably than usual this time, for on looking forward into the next 12 months, we out here can see nothing that will in any way hinder us from having the most wonderfully prosperous year in our history. New settlers are coming in; new country is being opened up by the railroads and electric roads; the big ranches which have heretofore hindered the development of Oregon and Washington are being broken up into smaller farms; the water powers and other natural resources in this wonderful Pacific Northwest are being utilized as they never have been before, and, all in all, we look forward confidently to a most unusually prosperous year.

In conclusion, let us urge all your readers who possibly can do so to make their vacation trip this summer to the Pacific Northwest. We have this year as special attractions the magnificent Rose Festival in Portland and the Alaska-Yukon-Pacific Exposition in Seattle; but even more important than these special attractions is the opportunity it will give you to see the wonderful country out here with its marvelous scenery, second to none in the world; its cool and delightful summer weather and its always ideal climate.

We hope to have as many of your readers as possible in the Pacific Northwest this year, and wish them all a Happy New Year.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—The year 1908 has not been a satisfactory one for the Hardware business in the South. At the opening of the year many merchants and manufacturers were hopeful. We realized that we had just been through a severe panic, but the general opinion was that the recovery would be quick because of the fact that our country was in such a splendid condition. In this we were disappointed. The effects of the financial depression were more far-reaching than some of us expected.

When we didn't receive the business we expected in January, February and March, the heaviest months in the year for volume, we fully expected that it would come later on, but instead of trade being heavier in the spring and summer months it was much lighter. The Presidential election evidently had its usual effect on trade. The timber and lumber business which is a good feeder for the Hardware trade was hit pretty hard by the financial depression, and has been slow to recover. The phosphate industry was one of the first branches of business to suspend, and one of the last to resume. This threw a great many people out of employment and was very injurious to the Hardware trade, both wholesale and retail.

In the tobacco districts a very disturbing element was the night riders, who have almost paralyzed business in many counties in Kentucky and a few in Tennessee, but all of this trouble now seems to be behind us. The lumber business is resuming, the phosphate industry seems to have stronger financial support than ever and the prompt and positive action taken by Governor Patterson of Ten-

nessee in calling out the State troops to surpress the night riders has had the effect of suspending their depredations throughout the Southern country.

There has been a gradual improvement in business for the past 30 days. December, which is usually not as good a month as November for Hardware, has proved to be much better this year. Nineteen hundred and nine is entering under very encouraging conditions, and we will be very much disappointed if it does not prove to be a good year for business. Spring trade opens here promptly on January 1, and we can already see some evidence of a very positive revival of business.

Cleveland.

W. BINGHAM COMPANY.—The Cleveland Hardware jobbers and manufacturers confidently believe that during the year 1909 they will have as large, if not the largest, amount of general Hardware trade that they have ever enjoyed. The year opens up with many large assorted orders booked for early seasonable goods for shipment in the first quarter of the year.

Cleveland is one of the best distributing points in the United States, both by steam and interurban electric railroads, also water routes through the chain of the Great Lakes. The five large Hardware jobbing houses of Cleveland—from the large trade they enjoy—believe they give satisfactory service to their many customers, not only locally, but all over Ohio, and in many other States from which they solicit and draw trade.

The Cleveland manufacturers make many articles in the Hardware line and market them all over the world, and we believe that a period of prosperity is before us for sound credit and general confidence is present with us all over our land. After the house cleaning of last year and the elimination of questionable men and methods from banking and other financial schemes and the general readjustment of affairs, the business of our whole country is on a better basis than ever before. The great railroads are getting busy and are prospering, and we believe the year of good times in business is before them.

The manufacturers of our country are such immense producers that when they run their factories full blast they must have an outlet or dumping ground for their surplus. Take, for instance, only two of our basic products. In 1865 there was manufactured in United States 831,000 tons of pig iron, in 1907 26,000,000 tons. In 1867 19,000 tons of steel was manufactured; in 1907 over 23,000,000 tons.

When we think of this vast expansion, and consider into how many different manufactured articles these two basic products enter, naturally we must prepare ourselves for the surplus that we will have and look about us to see where we can dump this in foreign countries. Now why not begin at once to shine up to our neighbors in the great South American country and not sit quietly down and let such a large portion of business that rightly belongs to us go to England, France and Germany. Is not the first step to be taken to get a firm hold on this Southern trade the subsidizing of steamship lines by our own Government, and send American goods in American vessels built in American shipyards and manned by American seamen to South America? Why should we Americans longer object to take this, the first step, to secure and forever after control this trade that rightly belongs to us? Think it over.

Our road salesmen are now with us, and we shall during our meeting discuss many things that pertain to our special interests and business, and they will then return to their homes fully cocked and primed to look after our own and our customers' interests during the year 1909, which we predict will be a corker for business.

There are many goods that dealers have not ordered for spring shipment that should have their attention now—namely, Lawn Mowers, Hay Rope, Steel Goods, Eave Trough, Conductor Pipe, Shovels and Spades, Wool Twine, Sheep Shears, Netting, Wire Cloth, Lock Sets, Rubber Lawn Hose, Step Ladders, Nails and Wire, Screen Doors, Window Screens, Factory Milk Can Stock, Galvanized and Tin Roofing, Horse and Sheep Clippers, Scythes, Snaths and many other items. The present prices are right and there is a chance that some will advance in price soon. Now is the accepted time to get under cover.

We sincerely hope our many friends in the trade will commence this year happily and that continued happiness and a good, substantial and prosperous trade will be their lot 365 days, A. D. 1909.

Baltimore.

CARLIN & FULTON.—But for the fact that one has 12 months less of his allotted life to live there would generally be little regret from a business standpoint that the year 1908 has ended; and the wishes for the happiness which 1909 is to bring are emphasized by the recollections of the gloomy outlook of a year ago.

The severity of the shock given to business prosperity by the financial troubles of the late fall of 1907 was most forcibly felt by the manufacturing and mercantile interests of the country after the beginning of the year, and continued through the winter and spring, until finally it was realized that the basic conditions for business were sound, and after a check given to mad speculation and to dishonest methods of finance, trade began to resume normal proportions, and the year has ended with a feeling of hopefulness for the future. Another reason for the unsatisfactory trade in 1908 was the distraction of a Presidential campaign, which, while it should not, nevertheless does interfere with business.

Following close upon the heels of the financial panic of 1907 came a curtailment of production by all manufacturers, and owing to the lessened need labor necessarily felt the stress of hard times, whereas but a very short time before labor dictated its own terms.

Economy on the part of the average consumer forced a hand to mouth policy in the purchase of the goods by the retailer. This all meant less freight for the railroads, with a great reduction in gross earnings, which they tried to offset as much as possible by reductions in operating expenses, in maintenance and in betterments. The tremendous shrinkage in bank clearings was indicative of the paralysis of trade, but also was due to the setback given to stock speculation.

The year 1909 begins with the finances of the country on a solid foundation, and the nation richer than one year ago by the addition of the immense crops with which we have again been blessed. While labor is not fully employed, it is more nearly so than at any time since October, 1907, and the rate of wages remains almost unchanged.

The economies of a year have depleted all stocks of goods, and there is no surplus in the hands of the manufacturers to demoralize prices. The revenues of the Government, according to the last reports, show a deficit as to the expenses, so, unless a reduced tariff will increase importations, the proposed revision is not likely to be radical.

The great fires of Baltimore and San Francisco destroyed an immense amount of the material wealth of the world, and had no doubt a certain effect on its finances; now comes the horror in Italy, but while the loss of life is immense, we doubt that the loss of property approaches either of the other disasters referred to.

The Panama Canal is a problem confronting this nation, and if the conditions there are as has been stated the American people should know them at the earliest opportunity. This is a rich country, but not rich enough to spend hundreds of millions of dollars without attaining the end desired. We suppose we will soon hear the facts, and it is to be hoped that success will yet crown the efforts of those building the canal, and that it will be completed without being too heavy a burden on the finances of this country.

We wish you and your readers happiness and great prosperity.

Omaha.

LEE-GLASS-ANDREESEN HARDWARE COMPANY.—An air of quietude now pervades the jobbing Hardware situation, and as the usual rush just prior to the holiday season has passed midwinter conditions will continue to hold sway until the regular signs predict the advent of

the spring season. The year 1908 did not end in a blaze of glory for the industrial world, but its close holds out an assuring promise of greatly improved conditions for the ensuing six months, or until the crop prospects are beyond a peradventure.

The upward movement which began when all doubt as to the Presidential election had passed is steadily gaining strength. It is reflected in the daily reports of the doings in the financial, industrial and commercial world to an unusual extent. The steel industry, generally accepted as the best barometer of industrial conditions, has been improving for months in most all lines, and the reports recently published indicate that the railroads are preparing for large outlays within the present year for general betterments. The banks throughout the country are holding more money than ever before, and funds are in sight for the prosecution of every legitimate business enterprise.

The territory from which the great jobbing centers located on the Missouri River draw their support has again been blessed with plentiful crops bringing substantial values, and the better tone now prevailing in Eastern manufacturing districts is found reflected here in an atmosphere of cheerfulness and confidence not in evidence a year ago.

The year opens, therefore, with but few clouds in the horizon, and those in sight are growing smaller on their scheduled way to final disappearance.

St. Paul.

FARWELL, OZMUN, KIRK & CO.—1908 closes satisfactorily in the Northwest. Of course, it has not been a large year, but it has turned out fairly well and fully up to expectations. The effects of the financial flurry of 1907 were felt here to some extent in 1908, especially in the early part of the year, but business at no time during the year was far from normal, and, as the season advanced and the crops gave promise generally of being up to average, confidence was fully restored, and business ran along in about the usual way.

The outcome of the crops has been fairly good. Crops generally were about up to average, and they were harvested and threshed in excellent condition. Prices were favorable, and the returns to the farmers for their year's work are now largely in, and the situation is upon the whole satisfactory.

It has also been a favorable fall for outdoor work, and fall plowing has been largely done, and farmers are generally in better shape than usual for the spring work.

The expected revision of the tariff will not likely affect business to a large extent during the first half of the new year. Whatever may be done by Congress in changes in the tariff they will necessarily not become operative until on in the fall, when the business of the early part of the year will have been out of the way.

Collections have been good, and accounts and credits are generally in better shape than usual.

NOTES ON PRICES.

Wire Nails.—During the holidays conferences have been held by wholesale houses with their traveling salesmen from all sections of the country, and decidedly hopeful views regarding future business were very generally expressed. This applies notably to Wire and Wire products. During the week the volume of business in Wire Nails has naturally been moderate. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads to jobbers	$1.95
Carload lots to retail merchants	2.00
Less than carloads to jobbers	2.00
Less than carloads to retail merchants	2.10

Galvanized Nails are quoted at $1 over the price of the regular Nails.

New York.—Demand in the local market is moderate, being restricted to small lots for immediate requirements. From nearby points inquiries have been received by jobbers as to carload prices, but large business has not yet materialized. Nails are held on the basis of $2.30 per keg, in small lots at store, but some sellers are occasionally inclined to shade this figure.

Chicago.—With the intervention of practically six holidays in the last fortnight of the year, conditions were altogether against the development of a large volume of new business within that period. At the same time orders did not fall off to the extent that was expected, though the amount of business coming in just now is comparatively light. Salesmen are now returning to their various fields, and by the end of the week the spring campaign will be fairly started. Manufacturers and jobbers are optimistic of the future, to the extent of expecting a good start and steady growth of business for the coming year. Uniform maintenance of prices, we are advised, continues to rule. Quotations are as follows: $2.13 in car lots to jobbers, and $2.18 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—New orders for Wire Nails in the past two or three weeks have been very light, but since the first of the year the traveling men have gone out on the road again, and it is believed the demand will materially improve during this month. We are advised that prices are being maintained and that the outlook for the Wire Nail trade for the next three or four months is regarded as satisfactory. The American Steel & Wire Company and the Pittsburgh Steel Company, the two leading makers, have a good deal of business on their books and have been operating to practically full capacity for some time. Spring trade will soon open, and new demand from the South should be heavy within the next two or three weeks. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers	$1.95
Carload lots to retail merchants	2.00

Galvanized Nails are quoted at $1 over the price of the regular Nails.

Cut Nails.—The market has reflected general conditions during the week, the result being a moderate amount of business. The trade are anticipating an increased demand for spring trade. The price for Steel Cut Nails is $1.80, base, per keg, f.o.b. Pittsburgh, for less than carloads, and $1.75 for carloads and larger lots, but this price is shaded in some cases. In the Western market Iron Cut Nails are held at an advance of 10 cents per keg over Steel Cut Nails, but this differential is not observed in the East.

New York.—The market continues in the same condition as last week, demand being rather light, as is usual at this season. Steel Cut Nails are held on the basis of $2.15 per keg for small lots at store, but this price is not strictly adhered to by all sellers.

Chicago.—Owing to the recent engrossment of attention in other lines, there has been but little done in Cut Nails in the past week. Aside from the temporary quietness due to seasonable causes, there has been no relapse in demand, which under the influence of building activity is slowly growing. Prices continue at about the same level, with $1.75, Pittsburgh, being done on carload lots. We quote Chicago prices as follows: In car lots to jobbers, Iron Cut Nails, $2.08; Steel Cut Nails, $1.98.

Pittsburgh.—Actual orders for Cut Nails are still confined to small lots for current needs, this lack of buying being expected at this season of the year, which is always quiet. It is stated that stocks of Cut Nails held by the mills and jobbers are very light, and now that traveling men have taken the road again, and with the near approach of the opening of spring trade, new business in Cut Nails will probably improve toward the latter part of this month. The market is fairly strong, and it is claimed that any cutting in prices would not leave a fair margin of profit owing to the high prices ruling for Steel. The market is $1.80, base, per keg, f.o.b. Pittsburgh, but $1.75 is made on carloads and over. In the Western market Iron Cut Nails are held at an advance of 10 cents per keg over Steel Cut Nails, but this differential is not observed in the East.

Barb Wire.—Manufacturers are looking forward to spring demand from the South and Southwest as the com-

mencement of a revival of business in this line. The present call for Barb Wire is exceedingly light. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.10	$2.40
Retailers, carload lots	2.15	2.45
Retailers, less than carload lots	2.25	2.55

Chicago.—Only a few new orders are being entered, and everything is awaiting the beginning of the spring demand. Reports from salesmen, especially those in the South and Southwestern territory, are of an encouraging nature as respects the outlook for spring business. It is expected that orders from the South will begin to come in at a good rate early this month. Quotations are as follows: Jobbers, Chicago, car lots, Painted, $2.28; Galvanized, $2.58; to retailers, car lots, Painted, $2.33; Galvanized, $2.63; retailers, less than car lots, Painted, $2.45; Galvanized, $2.75; Staples, bright, in car lots, $2.25; Galvanized, $2.55; car lots, to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—This line has been very dull in the last month in the way of new orders, but it is expected that demand will be materially better this month, especially from the South, trade in this part of the country usually opening up very early in the year. Contracts have been pretty well cleaned up, and shipments of Barb Wire by the mills for some time have been light. It is stated that regular prices are being maintained in spite of lack of new business. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.10	$2.40
Retailers, carload lots	2.15	2.45
Retailers, less than carload lots	2.25	2.55

Plain Wire.—Consumers have anticipated their requirements to some extent by placing contract orders for forward shipment. Mills are looking forward to a good demand for Plain Wire. Prices are reported as being well maintained. Quotations per 100 lb. to jobbers in carload lots are as follows, on a basis of $1.80 for Plain and $2.10 for Galvanized, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days, the price to retailers being 5 cents additional:

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.80	1.85	1.90	1.95	2.05	2.15	2.25	2.35
Galvanized	2.10	2.15	2.20	2.25	2.35	2.45	2.85	2.95

Chicago.—A fair tonnage of Plain Wire has been contracted for by manufacturers for shipment during the present quarter, and specifications against these contracts are beginning to come in. Mills are getting ready to meet the demand, which, it is expected, will soon require the operation of practically all their mill capacities. The outlook for a satisfactory volume of business in Fencing is good, and consumption in other lines is expected to materially increase. We quote as follows: Car lots to jobbers, $1.98, f.o.b. Chicago, and to retailers, $2.05.

Pittsburgh.—Jobbers and consumers are confining actual orders to small lots for current needs, but it is believed there will be a more active demand in the latter part of this month or in the early part of next month. The mills still have some unfilled contracts on their books on which specifications are coming in at a fairly satisfactory rate. It is stated that prices are being maintained. Quotations per 100 lb. to jobbers in carload lots are as follows, on a basis of $1.80 for Plain and $2.10 for Galvanized, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days, the price to retailers being 5 cents additional:

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.80	1.85	1.90	1.95	2.05	2.15	2.25	2.35
Galvanized	2.10	2.15	2.20	2.25	2.35	2.45	2.85	2.95

Wells Bros. Company.—The Wells Bros. Company, Greenfield, Mass., announces that beginning January 1 all invoices will be rendered payable 60 days from date. If paid on or before the 15th of the succeeding month, invoices will be subject to a cash discount of 2 per cent.

Picks and Mattocks.—Leading manufacturers of Picks and Mattocks have just withdrawn their quotations and are announcing advances of 10 per cent. or more.

Mop Sticks.—A revised schedule of prices has recently been sent out by leading manufacturers of Mop Sticks, the figures representing a considerable advance on many lines.

Soil Pipe.—There has been quite a marked change in the appearance of the market on Cast Iron Soil Pipe, which has for a long period been low and irregular. Demand is said to have increased materially during the month of December, and leading manufacturers have established their prices on a basis from $1 to $2 per ton, or from 2½ to 5 per cent. higher than recently prevailed. The following base discounts are named for orders delivered in the metropolitan district, beyond which additional concessions of 10, 10 and 5 per cent. are obtainable on fair quantities:

2 to 6 in. Standard Pipe	68½ %
2 to 6 in. Extra Heavy Pipe	74½ %
2 to 6 in. Fittings	81¼ %
7 to 16 in. Pipe and Fittings	47 %

In other territory the base discounts vary to cover differences in freight, a change of one-half point in discount representing about 50 cents per ton.

Wood Split Pulleys.—Manufacturers of Wood Split Pulleys have adopted a new and materially higher price-list. This is subject to somewhat greater discounts than formerly, so that the resulting advance is about 10 per cent.

Screws.—The manufacturers of Wood Screws have reaffirmed prices, and this line is regarded as entering on the year under improved conditions.

Window Glass.—The workmen are holding out for the adoption of the flat wage scale more tenaciously than the manufacturers at first supposed they would. According to a statement credited to the National Window Glass Workers' Association, 12 hand operated factories, representing a capacity of something over 400 pots, have signed up for the flat scale. Manufacturers who have unfilled orders on hand, taken on the price basis of the sliding scale, would lose money in filling them on the flat wage scale basis, and are therefore opposed to accepting it. On the other hand, the cutting of selling prices by manufacturers has reduced workmen's wages, on the sliding scale basis, to a very low point, and they see no prospect of their condition being improved under the sliding scale plan. The manufacture of hand made Glass has amounted to almost nothing since December 19, when the strike began, and according to reports manufacturers had little unsold Glass on hand at that time. Indications point to higher prices whether the strike continues or the manufacturers accept the flat scale and make Glass. It is understood that the new discounts of the American Window Glass Company are 90 and 20 per cent. for single and 90 and 25 per cent. for double strength Glass, from manufacturers' list. As stated last week, the Western Window Glass Jobbers' Association adopted discounts from the jobbers' list of October 1, 1903, which is about 25 per cent. higher than the manufacturers' list, as follows: Single, 90 and 25 per cent.; Double, 90 and 30 per cent. The Eastern Window Glass Jobbers' Association at its meeting last week, adopted the same discounts. Since manufacturers of hand operated plants have had more leisure, many have been working for the consummation of the Imperial Glass Company project, and, it is understood, with some prospect of ultimate success.

Rope.—There has been comparatively little doing in the Cordage market during the week, and no marked revival of business is immediately looked for. The trade should bear in mind that manufacturers in quoting on Manila Rope make three distinctions, Manila, Pure Manila and Best Pure Manila. Quotations on small quantities of Rope, 7-16 in. in diameter and larger, are as follows: Best Pure Manila, 8¾ to 9 cents; Pure Sisal, 6¾ to 7 cents. Mixed grades of both kinds grade down in price according to quality. These prices are sometimes shaded ¼ cent on larger orders. Jute Rope, ¼-in. and up, No. 1, is 6½ to 6¾ cents; No. 2, 6 to 6¼ cents.

Linseed Oil.—On December 30 crushers advanced the price of Oil to a basis of 50 cents per gallon for Raw, in lots of 5 bbl. or more. During the past 60 or 70 days Seed has been advanced more than 30 cents per bushel. Some in the trade express the opinion that those in con-

trol of the Seed market are in a position to force the price of Oil to 60 cents per gallon, and would not be surprised to see it reach that figure. Quotations in 5-bbl. lots are as follows: State and Western Raw, 50 cents per gallon; City Raw, 50 cents per gallon. Boiled Oil is 1 cent advance on Raw.

Spirits Turpentine.—The months of January and February are usually looked upon as dull ones in the Turpentine market. Comparatively little is doing in the local market, and the accumulation of stock is large at Savannah. The new crop from Florida generally begins to come into market in April. The New York market is represented by the following quotations: Oil Barrels, 41½ to 42 cents; Machine Made Barrels, 42 to 42½ cents per gallon.

RETAIL HARDWARE CONVENTIONS.

The following conventions will be held during January, February and March, the list being arranged in the order of dates:

OREGON RETAIL HARDWARE AND IMPLEMENT DEALERS' ASSOCIATION, January 19 and 20, Portland. Secretary, W. P. Balderson, Portland.

TEXAS RETAIL DEALERS' HARDWARE AND IMPLEMENT ASSOCIATION, January 19-21, Dallas. Hardware Exhibition. Secretary, J. W. McManus, Dallas.

INLAND EMPIRE IMPLEMENT AND HARDWARE ASSOCIATION, January 20-22, Spokane, Wash. Convention and Hardware Exhibition at the Armory. Secretary, E. W. Evenson, Hutton Building, Spokane.

PACIFIC FEDERATION OF HARDWARE AND IMPLEMENT ASSOCIATIONS (embracing California, Oregon, Washington, Idaho and Montana), January 22, 23, Spokane. Convention and Exhibition at the Armory. Secretary, T. M. Shearman, Monadnock Building, San Francisco, Cal.

NORTH DAKOTA RETAIL HARDWARE ASSOCIATION, January 26-28, Bismarck. Convention at Commercial Club rooms. Official headquarters at Grand Pacific Hotel. Hardware exhibition at the Armory. Information as to exhibits and hotel accommodations may be obtained from N. S. Young, secretary, Commercial Club, Bismarck. Secretary, C. N. Barnes, Grand Forks.

MISSOURI RETAIL HARDWARE ASSOCIATION, February 3-5, St. Louis. Hardware Exhibition. Secretary, F. D. Kansteiner, 1008 Market street, St. Louis.

WISCONSIN RETAIL HARDWARE ASSOCIATION, February 3-5, Milwaukee. Convention and Hardware Exhibition at Public Service Building. George W. Kornely, secretary Exhibit Committee, 806 Third street, Milwaukee. Secretary, C. A. Peck, Berlin.

OKLAHOMA RETAIL HARDWARE AND IMPLEMENT DEALERS' ASSOCIATION, February 9-11, Oklahoma City. Convention and Hardware Exhibition at Exposition Hall. Secretary, D. C. Patterson, Bassett Building, Oklahoma City.

IOWA RETAIL HARDWARE ASSOCIATION, February 9-12, Des Moines. Convention and Hardware Exhibition at the Shriners' Temple. Secretary, A. R. Sale, Mason City.

PENNSYLVANIA RETAIL HARDWARE ASSOCIATION, February 10-12, Philadelphia. Hardware Exposition at First Regiment Armory. Secretary W. P. Lewis, Huntingdon.

WEST VIRGINIA RETAIL HARDWARE ASSOCIATION, February 16-18, Charleston. Secretary, Leslie Hawker Shinnston.

NEBRASKA RETAIL HARDWARE ASSOCIATION, February 16-19, Omaha. Convention and Hardware Exhibition, at the Auditorium. Secretary, J. Frank Barr, Lincoln.

NEW YORK STATE RETAIL HARDWARE ASSOCIATION, February 16-19, Rochester, Headquarters and Convention at Hotel Seneca. Hardware Exhibition at Convention Hall. Chairman Exposition Committee, Louis J. Ernst, Rochester. Secretary, J. B. Foley, Syracuse.

ILLINOIS RETAIL HARDWARE ASSOCIATION, February 17-19, Springfield. Hardware Exposition; space in charge of F. B. Schlitt, Springfield. Secretary, L. D. Nish, Elgin.

KENTUCKY RETAIL HARDWARE AND STOVE DEALERS' ASSOCIATION, February 23-25, Louisville. Hardware Exposition. Headquarters at Seelbach Hotel. Secretary, J. M. Stone, Sturgis.

MINNESOTA RETAIL HARDWARE ASSOCIATION, February 23-26, Minneapolis. Convention and Hardware Exposition at the Armory. Secretary, M. S. Mathews, Guaranty Building, Minneapolis.

OHIO HARDWARE ASSOCIATION, February 23-25, Columbus. Convention and Exposition at Memorial Hall; W. M. Crumrine, Chairman Exhibit Committee, Salem. Secretary, Frank A. Bare, Mansfield.

CONNECTICUT RETAIL HARDWARE ASSOCIATION, in February, Waterbury. Secretary, J. DeF. Phelps, Windsor Locks.

INDIANA RETAIL HARDWARE ASSOCIATION, March 2-5, Indianapolis. Headquarters, Hotel Effglish. Hardware Exposition. Secretary, M. L. Corey, Argos.

SOUTH DAKOTA RETAIL HARDWARE ASSOCIATION, March 2-5, Huron. Convention and Hardware Exposition at the Auditorium. Secretary, H. E. Johnson, Redfield.

CALIFORNIA STATE RETAIL HARDWARE ASSOCIATION, March 10-12, Oakland. Secretary, L. R. Smith, Oakland.

NEW ENGLAND RETAIL HARDWARE DEALERS' ASSOCIATION, March 11-12, Springfield, Mass. Hardware Exhibition. Secretary, Charles L. Underhill, Somerville.

Correspondence.

TITLES, LONG OR SHORT, WHICH?

To the Editor: Any one who has to do with an extended list of business names or an index, more or less voluminous, must have been struck by the peculiar combinations or accidental significances which he will find to exist. Nearly every one has his story to tell of Schneider the tailor, Fleischhaker (anglicized into Flyshaker) the butcher, Haycock & Rideout, the livery stable men in Maine, and so on, but possibly the readers of *The Iron Age* would be more entertained by the presentation of a few of those with whom we are more or less familiar, names which with slight variation may be found in *The Iron Age* classified list of advertisers or in his own purchase ledger index.

Permanence of Old Firm Names.

As a preliminary, we may start out with the assertion that the title should be for advertising purposes, somewhat descriptive, and should carry identification to the public, especially if a concern is not over well known. There would be precious little use, for example, in the Burden Iron Company changing its corporate name to the "Burden Horseshoe & Genuine Old-Fashioned Iron Rivet Company," or of Henry Disston & Sons altering theirs to read "Disston Hand & Cross Cut Saw, File & Trowel Works." The old names, survivals of the firms before corporations came in vogue, are so firmly embedded in the Hardware foundations of the country that any effort to substitute another, no matter how it might appeal to the oncoming generation of buyers and users, would be resented by the old timers in the business. But there are some later ones whose titles would not be a whit caricatured by such highly specialized extension.

Corporate Names That Mean Little.

On the other hand, we may criticise some of those who think that the Union Hardware Company or the Union Mfg. Company or the Boss Mfg. Company or the Perfection Mfg. Company or the Acme Mfg. Company or the Globe Mfg. Company or the Gem Mfg. Company are distinctive enough. Some of us are strong States' rights people, and the "Union" designation does not appeal to us above all things else. Then, too, the Boss Mfg. Company, while it might strike us as being a little more American than the King Mfg. Company on the same page, still, it too might mean anything or indicate that anything

and everything was manufactured within four walls, whether they were kings or knaves for the nonce.

Some Names with a Point.

The Dandy Belting Company is a model, and nobody can deny the right to carry out the injunction on the head of the stationery of Liveright Bros., especially as they follow hard on Buck Bros., while the propriety of proximity on the part of a Mr. T. Dust and a Mr. T. Potts is unquestioned. Then here are two more which would seem to have something to do with each other, as the bane, the antidote, the Imperious Bite & Snap Company and the International Safety Snap Company.

Crisp Titles Stick.

Those of us who can remember a few years back doubtless have shared the writer's satisfaction in the name of the tobacco manufacturers, Gail & Ax. It was posted all over the country with not even a final "e" on the Ax. It had a fresh, breezy, sharp-edged, decisive sound to it that carried conviction. The trade unconsciously takes up with a name easy to remember and often declines to put on any frills. Towne & Gowne, for instance, might as well leave off the Mfg. Company. People won't have it that way.

Titles That Tell a Lot.

It might be worth while, in contrast to these names of witty brevity, to note some of the longer descriptive titles. Here are, for example, The Louisburg Discontent Yawning & Breakneck Company, the United States Cast Iron Pipe & Foundry Company, the Kaw Kaw City Dickey Bird Target & Trap Company, the United States Steel Products & Copper Company, the Harrisburg Pipe & Pipe Cutting Company, International Automobile & Vehicle Tire Company, Boyer, Radford & Gordon Tank & Pump Company, International Phonographic Language Schools, Inc., Newport News Shipbuilding & Dry Dock Company.

After reading a few of these we are left wondering if the rubber stamp man did not preside at their birth. It is quite a relief to turn again to simple titles, such as the Handy Things Company, even though you are not quite sure how many things can be classed under this heading.

Some of the above have been slightly varied from the originals, but they will be readily recognized. Who will care to add to the list? W. R. B.

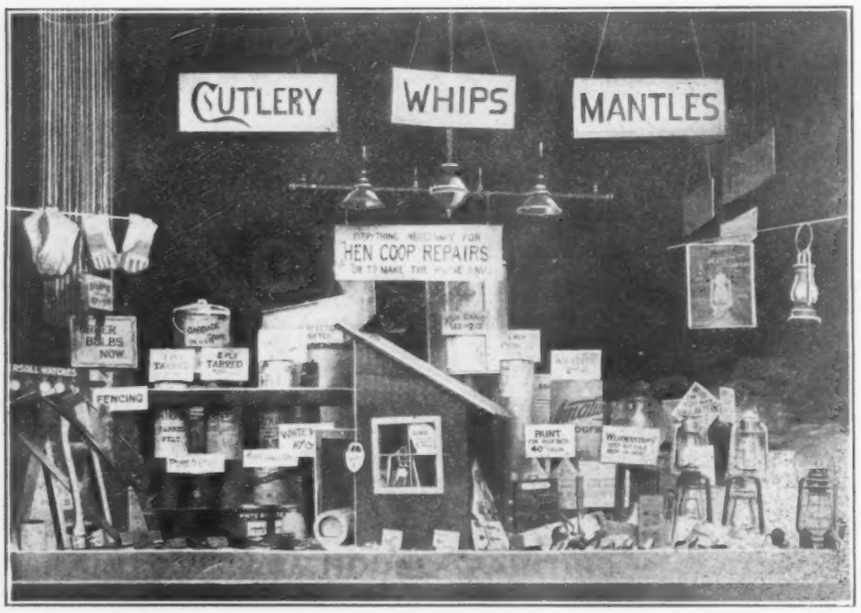
LOUISVILLE, January 2, 1909.

THE business of the late John Dickinson, established in 1797, and which for the past 11 years has been carried on by his estate, has been purchased by his son, Thomas L. Dickinson. John Dickinson was a pioneer in making special shaped Diamond Points for turning emery wheels, corundum wheels, paper calendar rolls, hard rubber, fiber, &c. Thomas L. Dickinson learned the trade with his father 25 years ago, but started on his own account in 1892. He has established an agency in London, and besides supplying the best mills in this country with his Diamond Points is sending them to all parts of the world as well. Mr. Dickinson is now located in the offices formerly occupied by his father at 64 Nassau street, New York.

CLEVER GROUPING OF GOODS.

MISCELLANEOUS window displays are, of course, very frequently used by Hardware merchants, and often with success, although their appeal is so general that it is usually difficult to trace their direct results. The most skillful window dressers prefer to make most of their displays center around some distinct idea or allied group of goods. A man endowed with ingenuity and wit can often find a connection between goods not obviously related which will enable him to incorporate them in a display which will both interest and amuse the public. A window display which amuses, and at the same time suggests sales, is almost invariably a triumph, since it creates a lasting impression in an observer's mind, connecting the store with the lines featured.

An excellent example of this clever grouping of goods not obviously allied is indicated by the display here reproduced which centers around no less homely a subject than a hen coop. It was arranged by I. J. Haskell, who has charge of the store of Nelson S. Haskell, Lynn, Mass. In the case of many of the goods included in windows the association with chickens is somewhat remote, but it is there, and is more than once suggested in a humorous way calculated to start a smile. For instance, a hen coop might require a Padlock, but not one large enough for a barn, and such a Lock as shown in the display is funny when viewed alongside the window of the coop, which has three lights of glass broken out. Neither would a hen coop require Hinges large enough for a barn door, like those shown in the window, but a man sometimes needs a Lantern in looking after his poultry, and thus Lanterns are pertinently included in the display, the one shown inside the coop being lighted at night.



Goods Ingeniously Grouped.

The Axe shown at the left of the window may suggest the fate of birds intended for the table, while the connection of Poultry Netting, Fencing, &c., is of course obvious. The Saw Horse and Buck Saw may have been used in making the coop, which was covered and roofed with Tarred Paper. Thus another line was brought into the display, and the word "Roofing" was painted across the roof of the shanty. There were a few other miscellaneous goods in the window, and a sign above calling attention to the fact that the store carried "Everything Necessary for Hen Coop Repairs or to Make the House Snug."

BUTLER BROS., Chicago, announce the establishment of a sample house in Seattle, Wash., which will be open February 1. The new house is the firm's second headquarters in the Far West. It is referred to as something more than an ordinary sample house, as it will represent one of the largest assortments of general merchandise ever shown in the Northwest, duplicating, in fact, the display made in Minneapolis. Butler Bros. have warehouses in New York, Chicago, St. Louis and Minneapolis, with sample houses at Baltimore, Omaha, San Francisco and Dallas.

Export Trade in 1908.

The financial and industrial depression of 1908 affected the foreign commerce as well as domestic trade. Financial stringency in the United States accompanied by materially lower prices usually greatly augments shipments abroad, but there was not during the year the marked decline in price, broadly speaking, of former panics, and moreover, coincidently with our reverse foreign countries had their own troubles as a variety of causes curtailed their buying power. The constantly increasing employment of modern equipment for transmitting news and business information and for the transportation of goods, with the establishment of closer ties, governmental, mercantile, and social, is bringing the countries nearer together and facilitating commerce. For instance, the important Argentine market is now as near to us as Europe was a comparatively few years ago. Experienced exporters, while recognizing declines in volume and value of exports, are of opinion that nevertheless we are on a sounder basis than we were. While business in the domestic market fell off sharply immediately after the collapse of October, 1907, orders from abroad kept export houses in the United States quite busy until the following May, since which time it has been very quiet. Now, while the domestic market has improved somewhat, it is believed that orders from abroad will require some months yet to show any marked improvement.

Growth of Direct Relations Between Manufacturer and Foreigner.

The marketing of manufactured products direct from maker to foreigner is increasing in volume, especially in large articles or output important enough to justify the expense of maintaining representatives abroad. Much of the smaller merchandise still passes through regular channels, but many manufacturers make direct shipment to regular customers. The aim of the producer is to curtail commissions and incidental expense, but unless he is thoroughly informed and shipments are large enough and of sufficient value he may economize in one way and lose in another. Again, unless the selling organization is well developed and competent to pass on credits in any country with which business is carried on it is found advantageous to use an intermediary responsible house. There is, however, on the whole an evident increase in direct business.

Cable Superseding Mail Communication.

For years there has been an increasing use of the cable for soliciting and transmitting quotations. This is especially true regarding staples running into tonnage and where the fluctuations demand quick offer and acceptance, particularly for long distances where mail time is longer and steamships are not in a class with the Atlantic liners. Interest savings on goods in transit warrant cable tolls, which are made more advantageous by using codes. Manufacturers are assisted along this line by the incorporation of code words against each catalogued article with an addition of certain forms dictated by experience applicable in general ordering. For example, Binder Twine, sold very closely, is largely marketed by cable. Case oil, lumber, plaster, provisions and kindred goods are in the same category. Enterprising houses sometimes make up a sort of *pro forma* invoice for the mail, first protecting themselves by obtaining an option or refusal with sufficient time to hear from their customers by cable, so that the transaction may be closed by cabling a few words.

Influence of Reduced Letter Postage.

The recent reduction in letter postage from 5 cents to 2 cents per ounce between Great Britain and the United States, to the level of our domestic rate, which, with our neighbors, Mexico and Canada, has been effective for nearly 20 years, must necessarily exert a favorable influence in promoting increased correspondence, at least in the initial stages leading to the establishment of connections. Postage bills with large houses constitute a snug sum. The action of Germany in meeting this English concession with a similar rate for postal matter going direct to German ports, effective January 1 (otherwise the regular rates of the Postal Union via English, French or other ports), will soon cause general reductions to the 2-cent rate, it is believed, at least by the more important countries.

Steam vs. Sail.

Each successive year witnesses a supersedure of sail by steam in ocean carriage, and while the process has been going on for years, it is more pronounced now than ever. The element of time, interest on investment, condition of consignments at destination and greater certainty of steamships over sailing craft are some of the reasons for the increased use of steam. As a rule, only shipments of coarse goods and staples or merchandise for out of the way ports, the business of which doesn't justify steamer calls, are routed by sailing vessels. The constantly increasing tonnage of steamers and lower percentage of transportation cost, the increase of regular lines between ports displacing even the pioneer tramp seeking charter parties for ports, are markedly hastening the decrease in sail transportation. It used to be the custom to make out three sets of bills of lading, on account of the uncertainties of navigation; now the common practice is but two sets.

Exporters' and Importers' Association.

The American Exporters' and Importers' Association became effective during the past year, although actually organized May 23, 1907. The project had received years of consideration at the hands of some of the prominent and farsighted New York exporters and importers, but a working executive force was chosen early in the year and permanent quarters obtained. Its object is the development of new and larger markets, judicious treatment of credits, and the treatment of numberless trade questions here and abroad, perplexing to both seller and buyer.

Foreign Parcel Post.

Various concessions have been consummated, effective at the beginning of the New Year, relating to Austria, Bolivia, Chile, Ecuador, France, Germany, Great Britain, Italy, Peru, Uruguay and the Netherlands. The changes are principally increases of weight to 11 lb. from 4 lb. 6 ounces, reductions in rate per pound from 20 to 12 cents, a greater limit of value, and withdrawal of compulsory registration in some instances. Not much of an export business in volume or value in Hardware or related lines can be conducted through the medium of a parcels post, but the increased facilities and greater scope may be availed of at times in the distribution of samples, catalogues and other trade literature, on much more favorable terms than by express, parcel receipt, &c. Parcels post conventions with the United States now cover over 50 countries, the customary limit of value being $50 per package; weight and rate, with few exceptions, 11 lb. and 12 cents per pound, respectively.

Full Prepayment of Postage.

The foreign merchant is still very sensitive on the subject of short paid mail. In some countries, as was formerly the custom here, shortages are doubled as a fine, and where the foreign correspondence is large the postage is a serious charge for which the recipient is in no way responsible. One instance will illustrate the point. A letter to a Scandinavian correspondent, short paid, was refused by the addressee and returned to the United States. It happened to contain bills of lading for a shipment. After much loss of time the documents were returned, the goods awaiting their arrival, while storage and other charges accumulated. There the business of the New York exporter with that customer terminated. A proposition is being worked out to make available the stamps of one country for postage from certain foreign countries into the country from which the stamps emanate. For example, if an American merchant in addressing an English correspondent wishes to inclose a stamped envelope for reply that it may bring the answer back instead of proving practically worthless.

Languages of Commerce.

There is no doubt that each passing year results in substantial increase in the use of the English language

for purposes of commerce and diplomacy. The successful and progressive houses, nevertheless, are equipped to put in the language of the leading countries they transact business with, letters, catalogues, circulars, &c., at once intelligible to the recipients, either in their own language or one closely allied with it.

Consular Reports.

The commercial status of the Government Consular reports, issued by the Department of Commerce and Labor, are being more and more favorably considered by manufacturers and exporters interested in foreign business. The processes of selection for the consular and diplomatic service on competitive lines, based on merit and fitness for the duties involved, are beginning to show better results, and a study of the leaflets issued daily by the Department can be made advantageous. The voyage of the battleship fleet has now taken the flag nearly around the globe, and, judging by the hospitalities extended, has put the nation more prominently in the foreigner's mind than was the case previously. Trade may in this case follow the flag.

Hannibal Green's Son & Co.

EDWARD M. GREEN AND WILLIAM M. SANFORD, comprising the firm of Hannibal Green's Son & Co., Troy, N. Y., are receiving congratulations on their one-hundredth anniversary. The business was established in 1809 under the style of Hart & Nazro, continuing thus until 1821, when Nazro & Curtis succeeded. This style prevailed until 1827, from which time until 1832 the business was continued by Henry Nazro under his own name. In the latter year Nazro, Thurber & Green succeeded, this partnership continuing for two years. Nazro & Green was the style beginning in 1834, Green & Cramer succeeding in 1838. For 14 years there was no further change, but in 1852 Hannibal Green became the sole owner of the business, which was continued under his name until 1875, when the present firm succeeded.

THE CLARK BLADE & RAZOR COMPANY, Newark, N. J., has been organized to manufacture a Safety Razor and also an ordinary Razor in which a wafer blade can be placed the same as in Safety Razors. The latter blades will cost only a little more than the best Safety Razor blade. The company also intends to manufacture a full line of Blades to fit all Safety Razors. A complete plant has been fitted up at 56 Summer avenue, and the company hopes to be in a position by February 1 to begin the manufacture of the Razors as well as the Blades. The starting capacity on the Blades will be, it is expected, 50,000 per day. The Blades will be made under a patent process, and the company will guarantee absolute temper on each Blade. In addition the company will turn out about 1000 Razors per day.

WILLIAM FLEMING MCCARROLL, one of the city's best known and influential citizens, died at Ottumwa, Iowa, on the 17th ult. Mr. McCarroll was born August 2, 1869, in Kirkville, Iowa, and moved to Ottumwa when two years old. After leaving school he became associated with his father, the late W. F. McCarroll, in the Hardware business. On the death of the latter he with his brother continued the business, and was identified with the firm of McCarroll Bros. until four years ago, when the condition of his health obliged him to withdraw from active duties.

THE SNELL MFG. COMPANY, Fiskdale, Mass., sustained a loss by fire in one of its shops on the 5th inst., which will probably cause some slight delay in the shipment of common Auger Bits. The Ship Auger factories and the shops making other lines were uninjured, and these goods will continue to be shipped as promptly as heretofore. The damaged shops will immediately be replaced with new buildings.

ROBERT WORK & CO., Langdon, N. D., have purchased the Hardware business of Mercer & Lavin, established 21 years ago by Mr. Mercer, who has been continuously connected with it since that time.

CONTENTS. PAGE.

The Greatest Steel Plant in the World.—I. With Supplement. Illustrated 1
Sault Canal Traffic in 1908 11
An Automobile's Cost Analyzed 11
Automatic Metal Bottle Cap Machinery. Illustrated 12
Progress in Submarine Craft 15
The Ultimate Internal Combustion Motor and Its Probable Fuel 16
The Torrington Company's Annual Report 17
A Notable Low Pressure Turbine Installation. Illus 18
The Curves of the Machine Tool Trade. Illustrated 22
Mexican Business in 1908 23
The Nature and Treatment of Alloy Steel 24
Manufacturers' Interests in Isolated Plants 26
The Chicago Iron Trade in 1908 29
The Philadelphia Iron Trade in 1908 31
The Pittsburgh Iron Trade in 1908 36
The Cincinnati Iron Trade in 1908 40
The Tin Plate and Sheet Steel Trades in 1908 43
The Conquest of the Air. Illustrated 46
A Large Tod Blowing Engine 52
New Alliance Ladle Cranes. Illustrated 52
The Schultz Improved Friction Clutch. Illustrated 55
Bonuses for Australian Iron and Steel 55
Oxy-Acetylene Welding and Cutting. Illustrated 56
A Structural Steel Punching Record 61
Dunbar Furnace Makes a Large Output 61
The Pawling & Harnischfeger Type G Crane. Illustrated 62
Editorial:
Capitalization in the Steel Industry 64
The Problems of 1909 65
Auxiliary Steam Plants and the Drought 65
The Modern and the Old Foundry 66
Electricity at the Corn Show 66
Fire Losses Stupendous in 1908 66
New Iron and Steel Works Construction 67
British Steel Castings 69
The Retirement of Stanley G. Flagg, Sr. Portrait 69
William B. Dickson. Portrait 70
A Nodulizing Plant at Benson Mines 70
Customs Decisions 70
David G. Kerr. Portrait 71
Nodulizing Chateaugay Iron Ores 71
The Carnegie Steel Tie and Rail Joint 71
Tariff Revision Proceeds Slowly 72
News of the Works:
Iron and Steel 73
General Machinery 73
Bridges and Buildings 73
Foundries 73
The New York State Steel Company's Reorganization 73
The Pig Iron Curve for 1907-1908. Illustrated 74
Iron Output Mounting 75
The Iron and Metal Trades:
A Comparison of Prices 76
Chicago 76
Birmingham 78
Philadelphia 78
San Francisco 79
Pittsburgh 80
St. Louis 81
Cincinnati 82
Cleveland 82
Buffalo 83
Metal Market 83
Iron and Industrial Stocks 83
New York 84
The Berger Mfg. Company's Annual Convention 84
November Iron and Steel Exports and Imports 85
The Production of Copper, Spelter and Lead in 1908 85
Personal 86
Obituary 86
The Cincinnati Steel Foundry Sold 86
The Machinery Trade:
Prospects for the New Year 87
The New England Machinery Trade in 1908 91
Chicago Machinery Market 93
Cleveland Machinery Market 93
Cincinnati Machinery Market 94
Philadelphia Machinery Market 94
Government Purchases 95
Youngstown Sheet & Tube Company Improvements 95
The Clark Steel Hoop Company Starts Operations 95
Hardware:
Condition of Trade 96
Notes on Prices 101
Retail Hardware Conventions 103
Correspondence 103
Clever Grouping of Goods. Illustrated 104
Export Trade in 1908 105
Hannibal Green's Son & Co 106
The Hardware Market in 1908 107
A Comparison of Retail Hardware Prices 112
Price-Lists, Circulars, &c 114
Store Arrangements of the Fowler & Sellars Company. Illustrated 115
Automobile Show of Licensed Manufacturers 117
Graef & Schmidt 117
The Warren System 117
Whitman & Barnes Mfg. Company 117
Letter from E. C. Simmons 118
One Hundredth Anniversary of J. M. Warren & Co 121
Goodell-Pratt Company's New Catalogue 121
Requests for Catalogues, &c 121
Factory Cost and Business Methods. Illustrated 122
Profit Sharing Plans 124
Hibbard, Spencer, Bartlett & Co.'s Salesmen's Convention 124
Billy Jones—Advertising Manager 125
Farwell, Ozmun, Kirk & Co.'s Fiftieth Anniversary 126
Sash Operating Apparatus 126
Superior Brazing Compound 126
Barney & Berry's Extension Roller Skates. Illus 126
The Lily Clothes Line Reel. Illustrated 127
The Greenfield Miter Box. Illustrated 127
The Martin Flexible Barn Door Hanger. Illustrated. 127
Fuller All-Steel Stepladder. Illustrated 128
Solid Steel Drop Forged Ice Pick. Illustrated 128
The Wagner Barn Door Stay Roller No. 103. Illus 128
The Drew Galvanized Steel Feed Trough. Illustrated. 128
Steiner's Family Motor. Illustrated 129
The Star Floor Scraper. Illustrated 129
The Hildreth Floor Scraper. Illustrated 129
Billings Improved Sportsman's Knife. Illustrated 130
The K. & J. Pressed Boxes. Illustrated 130

THE HARDWARE MARKET IN 1908.

WHILE the volume of business was considerably affected by the general conditions underlying trade and finance, manufacturers and merchants are to be congratulated on the year's excellent record. With output and sales materially less than those of 1907, which however must be regarded as above the normal in volume, the Hardware market in 1908 escaped the demoralization which has often been experienced in periods of depression and comes out at the close of the year in admirable condition and ready to take good care of the business of 1909. While there has been a good deal in the way of reduction in prices values have been on the whole pretty well maintained. The special features of some of the leading lines are referred to in the following review:

Nails and Wire.

Business during the closing months of 1907 was comparatively light, owing to financial conditions, and stocks in the hands of distributers were kept at a minimum. The announcement of the decision of the manufacturers toward the last of January that there would be no reduction in prices for the spring trade had the effect of stimulating demand to some extent. The market on Wire Nails, Barb Wire and Plain Wire during the year just closed was remarkably even, as indicated by the accompanying table, which shows but one change, and that a decline of $2 per ton about the middle of June. This followed a reduction of $4 a ton in the price of Steel Bars about the first of the month. The lower price of Wire products was not followed by any pronounced increase in demand. There was a difference of opinion regarding the amount of reduction in the price of Nails, some thinking that it should have been more in conformity with the decline in Steel Bars. The reaffirming of prices on Wire Nails and all other forms of iron and steel on May 21 imparted a stronger tone to the market, but did not materially increase the demand, as spring business was about over. Buying in all lines of Wire products has not been as heavy as in 1907, owing to the conservative course pursued by the jobbing trade and retail merchants. Under general conditions, however, a good showing was made. Mills have had no difficulty in making prompt shipments, and there was no incentive for the trade to carry heavy stocks. There has been little anticipating of requirements, and conservative buying has been the rule. Open weather during the fall, which permitted fence building, materially prolonged the sale of Barb Wire and Plain Fence Wire. At the opening of the year Steel Cut Nails were quoted at $2 to $2.05. Demand has been light, and while there has been no change in regular quotations the market has gradually fallen off to $1.75.

The following table gives the opening base prices (f.o.b. Pittsburgh for car lots to jobbers) on Wire and Wire Nails for 1908, together with the subsequent changes and dates when they went into effect:

	Wire nails.	Cut nails.	Painted barb wire.	Smooth fence wire.
January 2	$2.05	$2.00	$2.20	$1.90
March 5	2.05	1.90	2.20	1.90
May 21	2.05	1.85	2.20	1.90
June 11	1.95	1.80	2.10	1.80
June 18	1.95	1.75	2.10	1.80

Steel Goods.

While there has been no substantial change in the conditions governing the Steel Goods market, a moderate revision of prices was made this fall by the leading interest and reflected in the quotations of independent manufacturers. The changes represented a slight advance on some second grade goods, but reductions of from 5 to 10 per cent. were made on a number of important items. It is reported that orders booked for next season are in good volume.

Builders' Hardware.

The policy of taking the bull by the horns was followed by the leading Builders' Hardware manufacturers, all of whom made a pretty general revision of their schedules early in the year and established prices representing more or less drastic declines from 1907. The wisdom of the movement seems to have been demonstrated. While competition for the reduced volume of business has of course been keen and there has been the usual cutting by smaller makers, quotations have been maintained on a fairly uniform basis and the market, although low, has been comparatively steady. Production has necessarily been heavily curtailed by the larger manufacturers who have operated their great plants on short time and with forces much reduced. Recently, however, conditions have shown unmistakable improvement. Discontinued building operations are being renewed and new ones undertaken; factories are running at a better pace and prices in general are firm.

Carriage and Machine Bolts, Nuts, Etc.

Prominent makers of Carriage and Machine Bolts and Nuts, Coach and Lag Screws, &c., have continued their periodical conferences throughout the year, although for the most part, their deliberations have not had much effect on the market. At the opening of 1908 actual orders were being placed at figures appreciably below the high level of 1907, the cuts of independent producers being quietly met by individual members of the association. As business fell off, quotations continued to decline, concessions wrung from one manufacturer by urgent need of orders leading to still further concessions by another in similar or greater exigencies. Something like demoralization succeeded, in spite of the monthly conferences, and quotations fell to a low level, near, if not in some cases, below cost. Raw material did not sustain a serious shrinkage, although for some time an unusual spread between iron and steel bars caused Bolt manufacturers to discriminate in favor of Iron. Prices on all classes of Bolts and Nuts have stiffened this fall and the conferring makers have made two moderate advances said to be justified by a revival in business immediately preceding and following the election. A feature of the year has been the abandonment of the effort to reduce the terms of cash discount from 2 per cent. to 1 per cent,, 10 days.

Stove and Tire Bolts.

In spite of the great falling off in business and severe breaks in the prices of allied lines, quotations on Stove and Tire Bolts have held steady throughout the year. The market may now be represented in a general way as it was 12 months ago by a discount of from 85 to 85 and 10 per cent.

Chain.

Great irregularity has characterized the market for Coil Chain throughout the year. In January quotations of $3.75 per 100 lb. for ⅜-in. were generally made, and the tendency has since been steadily downward in spite of several abortive attempts to improve the situation as the result of conferences between the manufacturers. The last effort in this direction which came early in the fall resulted in the establishment of an extreme price of about $3.25 base, but this held only a few weeks, and the market has since been demoralized. German pattern Coil Chain, Traces, Cow Ties, &c., which have been in better shape through the greater part of the year are now selling on a materially lower level and are weak and irregular.

Strap and T Hinges and Butts.

On February 10 a new price-list was adopted on Heavy Strap and Extra Heavy T Hinges, quoting all sizes per dozen pairs instead of at cents per pound. No other change of importance has taken place in this market during the year. Prices have been maintained with notable uniformity and on a fairly high level, not only by the manufacturers, but also by the jobbing trade, for whom in the past this has not been a very profitable line.

Conductor Pipe, Eaves Trough, Etc.

Increasing irregularity in Conductor Pipe, Eaves Trough, &c., was observed toward the end of 1907. This was aggravated about the opening of last year by lower prices for Sheets. The market continued practically an open one until March, when prices were again established on a fairly uniform basis. The irregularities which developed during the summer were corrected by a stiffening movement in September, but the market relapsed into weakness, and conditions at the close of the year are unsatisfactory. Conductor Elbows and Shoes, which had been utterly demoralized for many months, were generally advanced in September to a level represented by a discount of 80 per cent., a price which has since been fairly well maintained to average trade.

Leather Belting, Lace Leather, Etc.

The Leather market was weak at the opening of 1908 and showed little tendency to improvement during the first half of the year. Demand was unusually light, both for Belting and Lacing, largely because of inactivity in all lines of manufacturing. Before summer, discounts of 60, 10 and 10 per cent. were named on Cut Lace, and Sides sold below 20 cents per square foot. Low prices continued to prevail until early fall, when important advances took place in green hides, which were reflected by rising quotations for Lacing, until it reached a level close to 45 per cent. discount, Sides selling at from 24 to 25 cents. The market is now fairly well maintained by leading manufacturers, although lower prices are, of course, made on Split Lace. A general scaling up of quotations on different grades of Belt has taken place within the last few weeks. Special mention should be made of a movement, supported with evident sincerity by the majority of manufacturers, to protect the trade against short measure on orders for Cut Lacing and Sides.

Chisels and Drawing Knives.

Chisels and Drawing Knives at the opening of the year were considerably off from the high prices reached by the associated manufacturers during the spring and summer of 1907, when the extreme discount was not much below 75 per cent. With an open market and very little business offering, buyers had things all their own way and quotations sank lower and lower until fall, when they seemed to reach a bed rock level and a steadying tendency developed. Within a month or six weeks some extreme concessions have been withdrawn and the market has a slightly firmer tone, although it has yet to be subjected to actual test, business being in merely nominal proportions. As regards the general trade, prices on Chisels may be fairly represented by a discount of 80, 10 and 10 per cent.

Cast Iron Hardware.

The market on most lines of Cast Iron Hardware, including Blind Hinges, Gate Hinges and Latches, Pulleys, Sash Pulleys, Grindstone Fixtures, Well Wheels, Casters, Brackets, Harness Hooks, Cast Hammers and Hatchets, &c., has been irregular for the greater part of the year. Declines in raw material had to be reckoned with, besides a greatly reduced volume of business. Some new manufacturers also entered the field and caused lower prices on the lines to which they devoted their attention. Along in the spring a general downward revision of quotations was announced by leading manufacturers acting independently, after which various additional concessions were made from time to time according to the exigencies to be met. As the year closes, the market presents a demoralized appearance and prices current are lower than have prevailed for a long period.

Rubber Belting, Packing, Hose, Etc.

No particular features characterized the market for mechanical Rubber Goods in 1908 until toward the close of the year, when quotations on Crude Rubber advanced rapidly, showing an appreciation of close to 100 per cent. from the low price of the year to the extreme high price which was reached not many weeks ago. Some reaction has since followed, but the increased cost of the raw material has led to quite a general withdrawal of quotations on Belting, Packing, Hose, &c., and a number of manufacturers have already advanced their prices. The most noteworthy changes are in the better grades of goods, which contain the largest amount of pure Rubber. Some manufacturers, especially of lower grades, who were doubtless well stocked with raw material have not yet altered their schedules.

Augers and Bits.

Demand for Augers and Bits as for most other lines of Carpenters' Tools has been light for many months. The more or less formal understanding among leading manufacturers by which the market was held at 80 per cent. discount or thereabout did not survive the year 1907. As a result of sharp competition for the small business offering, prices developed great irregularity during the spring of 1908, buyers demanding and obtaining special concessions on moderate orders. Quotations thus reached a low point, said to approximate the cost of production, remaining on that level until within a few weeks, when a stiffening tendency has been observed. Extreme prices are now perhaps a little above the low point of the year, and at least 10 or 15 per cent. lower than a year ago.

Axes.

Unfavorable conditions led to an unusually small distribution of Axes during the season of 1906-1907. Thus jobbers were forced to carry over heavy stocks and manufacturers going into the market last spring found only a moderate business offering. Competition developed marked by considerable bitterness between the leading manufacturing interests and causing no little hardship to smaller producers, as well as to jobbers whose large stocks carried over showed a depreciation of from 50 to 75 cents per dozen. Owing, in large measure, to the jobbers' importunity, some manufacturers withdrew their extreme prices and endeavored to establish a base about 50 cents higher, which was largely fictitious so far as their larger customers were concerned. The action, however, may have enabled the jobbers to get somewhat better prices from the retail trade.

Galvanized Ware.

A decline of $4 per ton in Galvanized Sheets, which occurred early last January, was soon reflected by a moderate reduction on Galvanized Ware. Further declines on light Pails and Tubs took place during the spring, forced, it was said, by the aggressiveness of one or two independent manufacturers, until there was a considerable series of concessions following the discount of 10, 7½ and 5 per cent. generally ruling at the first of the year. These prices were declared to show no profit to the manufacturers, a claim which was borne out by the fact that few of them showed much desire to get business on competitive goods, merely accepting the orders tendered them by their regular customers. An advance of 5 per cent. on light Pails and Tubs was effected about two months ago and the market on these goods to the general trade may now be represented by a discount of 10, 7½, 5 and 5 per cent.

Ammunition.

Prices on standard brands of Ammunition have gone unchanged throughout the year and indeed for a much longer period. Manufacturers state that their schedules are based on fair average values for raw material and their policy is to maintain a stable market without regard to fluctuations in Copper and Lead. There was a moderate advance on Black Sporting Powder in the spring.

Hatchets.

About the middle of the year the manufacturers of Hatchets altered the arrangements on which they were working, their rebate proposition having, indeed, been withdrawn some time previous. A general reduction of 10 per cent. was made the first of July and the revised prices continued to be pretty well maintained. As the year ends, however, they are not entirely regular and it is understood that the market is an open one. Some manufacturers are devoting increased attention to Hatchets and at least one large house, the Kelley Axe Mfg. Company, has added this line to its product during the past year.

Bright Wire Goods, Etc.

Good prices were being obtained for Bright Wire Goods at the beginning of the year, although there had been some recession from the high point of 1907. The tendency, however, was downward, until summer when the differential between the the steel and brass varieties disappeared, and quotations of better than 90 and 50 per cent. discount were made to the larger trade. In October the market developed an improved tone, prices showing greater regularity and ruling about 10 per cent. higher. A further general advance of about 10 per cent. was made last month, and the market may now be represented in a general way by a discount of 90 and 33 1-3 to 90 and 40 per cent. Brass, Cup and Shoulder Hooks, which went below 90, are now quotable at about 85 and 10 per cent. discount. Wire Coat and Hat Hooks have declined materially during the year, and have been ruling at between 80 and 85 per cent. discount, although some manufacturers who made the lowest prices have recently withdrawn them, and a discount of from 80 to 80 and 10 per cent. may now be named to represent the market.

Twist Drills.

During the greater part of the year prices on the makes recognized as standard have been well maintained, but with business in moderate proportions. There has recently been cutting in price by several of the manufacturers, and the market is somewhat unsettled. Government requirements are a factor in such times as these, and being awarded for price considerations mainly have had an appreciable influence in the direction of lower quotations. Another disturbing element is the increased activity of a strong and well-known house which has only recently become a large factor in the Twist Drill business.

Brass Cocks, Valves, Etc.

Low prices have prevailed on Cocks, Bibbs, Valves, &c., as a natural result of the depression in Copper and Brass. Improvement in the latter market, however, has led to a stiffening in Brass Goods lines the last two months. The future course of prices depends mainly on the action of the raw material.

Sash Cord.

The price of Cotton Braided Sash Cord, which was maintained on a pretty high level during the greater part of 1907, was weak at the opening of 1908. Irregularity continued in spite of some attempts at steadying until April 1, when there was an open cut of 3 cents per pound, making the extreme price 19 cents per pound, base. There were few concessions beyond that quotation, which has been withdrawn this fall by most manufacturers, so that the market to large trade is from 1 to 2 cents per pound higher. On the whole, Sash Cord is in good shape, considering the low level of the cotton market.

Wire Picture Cord.

Quotations on Wire Picture Cord have been irregular throughout the year, being governed largely by the scrupulousness or nonscrupulousness of manufacturers as regards packing, and the more or less liberal attitude on this subject evinced by the jobbing trade. Guaranteed full length Cord, however, has been, and still is, very low, as evidenced by the fact that concessions obtainable by large buyers range below 90 per cent. discount.

Hammers.

Competition for orders on Handled Hammers has been sharp during the greater part of the year, especially as regards Machinists' Hammers, of which some new manufacturers have recently entered the field. A decline in the lat-

ter line of 7½ per cent. was announced October 1 and within the past month another reduction of 5 per cent. has taken place. Quotations to good retail trade now rule close to 75 per cent. discount. Heavy Hammers are selling at low prices, but not much below the figures current in the spring. The market may be represented in a general way by a discount on Hammers weighing less than 5 lb. of 80 and 10 per cent., and on heavier goods, 80, 10 and 10 per cent.

Spring Hinges.

Speaking generally, manufacturers' quotations on Hold Back Spring Hinges have not shown much change during the year, although some have made concessions on these goods to influence orders for the balance of their line. Quotations vary considerably because of differences in goods, but the prices which have been current may be represented by a range of from $6.50 to $7 per gross.

Jack and Safety Chain.

A general reduction in Jack and Safety Chain was made in the spring, representing a considerable change on Safety Chain and Brass Jack Chain, which reflected the decline in Copper and Brass. Since then quotations have shown a fair degree of steadiness and uniformity. The market to-day may be represented by a discount on Iron Jack Chain of 60, 10 and 7½ per cent., on Brass Jack Chain, 65 per cent. and on Safety and Plumbers' Chain, 75 per cent.

Window Glass.

The past year has been a trying one to hand operated Glass manufacturers, owing to troubles with Glass workers' organizations, competition with machine made Glass and a comparatively light demand. Jobbers have suffered, particularly in the East, because of light demand. The general trend of prices has been downward. Workmen's wages declined on the sliding scale basis until they reached the point of a meager subsistence. Towards the close of the year the Window Glass workmen formulated a flat wage scale to take the place of the unsatisfactory sliding scale, which calls for an immediate advance in wages of workmen in hand operated factories of from 36.7 to 41.6 per cent. The sentiment of the manufacturers is said to be against the adoption of the flat scale at this time. The necessities of a large portion of the manufacturers had been such up to July, as to require them frequently to forego profits to obtain money to meet their payrolls. In January the hand operated capacity was about 400 to 500 pots, and factory prices at that time were supposed to be unprofitable. In March the capacity had increased to about 1400 pots, with demand about one-third less than usually expected that season. In May there was a lack of uniformity in factory prices, the market being an open one. September witnessed the starting of a movement to form a selling company, through which all orders to Window Glass manufacturers were to pass, in order to bring about a better condition of affairs in the market. The plan has not yet proved acceptable to all manufacturers, but the idea has not been permanently abandoned. The market for the year has been an uneven one, and prices have been subject to frequent changes. Manufacturers' discounts, from the list of January 1, 1901, have ranged from 90 and 15 per cent., A Single, and 90 and 20 per cent., B Single and Double, to 90 and 35 per cent., single, and 90 and 40 and 5 per cent. double strength.

Linseed Oil.

Linseed Oil has been free from violent fluctuations in price during the year. The maintainance of an even market, for the most part, has been the result of the light supply of Oil and Seed in crushers' hands, the strength of the Seed market and the uncertainty as to the future of this market from month to month, rather than from any marked demand. The price of Oil has generally been low compared with the price of Seed, and considerably lower than it would have been with an active demand for Oil. The Seed market has been in the control of strong hands since the receipt of the new crop. Buying has been confined almost exclusively to small lots, by both consuming manufacturers and the trade, except in the few instances when prices have been temporarily low enough to offer inducement to large buyers to place contract orders.

Spirits Turpentine.

Turpentine in the New York market was sold during 1908 at a wide range of prices, while advances and declines, except those attributable to manipulation at Southern points, have generally been gradual from week to week, and to a large extent have reflected conditions in the Southern market. From January to March the general trend of prices was upward, a decline then setting in until the middle of October, since which time fluctuations have been comparatively slight. Up to August 1 the price of Machine Made Barrels had been kept above 40 cents per gallon at Southern points. In view of the unsatisfactory conditions affecting Turpentine producers in the State of Florida, a movement was started in Jacksonville in September to organize a corporation to be known as the Naval Stores Marketing Company. The chief object of the company was to eliminate from the industry purely speculative manipulation and the establishment of the business upon a sound basis, where it would respond to the law of supply and demand. In the New York market buying has fluctuated from moderate to hand to mouth purchases, requirements generally being met by jobbing lots. The lowest and highest quotations per gallon in the New York market during the year were as follows: October 8, Oil Barrels, 37¾ to 38¼ cents; Machine Made Barrels, 38¼ to 39 cents; March 26, Oil Barrels, 57½ to 58 cents; Machine Made Barrels, 58½ to 59 cents.

Soil Pipe.

The market for Cast Iron Soil Pipe was not in good shape at the close of 1907, being affected by declines in raw material and the financial exigencies of some manufacturers. Early in 1907 quotations stiffened up a little, but the improvement did not hold long and prices have since been irregular and so low, it is said, as to represent no profit to producers. As a result of recent efforts to secure better conditions, a number of makers have just announced a moderate advance which, if it can be held, and especially if business increases, may lead to further improvement.

Washers.

Prices on Wrought Washers show a material decline during 1908. Quotations a year ago were based on from $5.50 to $6 off list. At present they are from $6.50 to $6.75 off, a quotation which represents some advance from the low figures touched in the summer and early fall.

Squares.

Competition on Steel Squares has been sharp throughout the year and the line has been one of the weakest in the category of Carpenters' Tools. Concessions beyond the base discount of 80 per cent. have ranged to two tens and even more in the case of the jobbing trade. The bottom, however, seems to have been reached, since while there have been no advances, quotations have of late been stationary.

Stove Pipe and Elbows.

Prices on Stove Pipe and Elbows were weak during the summer, but stiffened up appreciably with the natural increase in demand in the fall. The market, however, was from 10 to 15 per cent. lower than in 1907.

Corn Poppers.

This season's prices on Corn Poppers, announced last June, showed a decline of approximately 10 per cent. from the quotations of 1907.

Agricultural Wrenches.

Early in the spring, the market on Agricultural Wrenches developed irregularly, and before summer prices declined to the lowest point for a long period. Large buyers received concessions of 3 and 4 tens beyond the base discount of 80 per cent. The last of November the manufacturers advanced their prices more than 10 per cent. and established a discount on case lots of 80 and 10 per cent.

Sandpaper, Etc.

Prices on Flint and Emery Paper and Cloth and Garnet Paper and Cloth have been remarkably steady throughout the year. Standard brands have sold at prices 10 per cent. or so above those of manufacturers whose product is not so well established, but the differential has apparently been accepted as reasonable and the market has been unusually free from competitive price cutting.

Registers.

In recognition of general market conditions and declines in raw material, manufacturers of both Cast and Wrought Steel Registers made a reduction in prices at the opening of the year, naming a discount on lots of 50 pieces in japanned, plated and bronzed finishes, of 70 and 10 per cent. June 1 the price was advanced to 70 per cent. discount, where it has since remained. Two or three independent manufacturers in the Middle West are selling below the usual prices.

Dripping Pans.

In spite of the bad year, prices on Dripping Pans were fairly well maintained until early summer, when irregularity developed which has since become acute, carrying quotations down from about 70 to 75 per cent. discount, and even considerably lower, where buyers would take a reasonable quantity.

Oilers.

An important advance in several classes of Oilers was effected in the spring and prices were pretty well maintained for a few months. Recently quotations have shown increasing weakness, beginning on copper plated steel goods and extending to other varieties, so that as the year closes prices are low and irregular.

Lawn Mowers.

For the season of 1908, prices on competitive grades of Lawn Mowers were held up to a higher basis than during

the previous year, being represented by a quotation on the cheapest machines of about $2 per Mower for the 10-in. size, with a differential of 10 cents for each size larger. The market for 1909 delivery, however, opened under less favorable conditions, and although the attempt was made to hold to last year's prices, they were soon cut and the size differential was not maintained, cheap machines being sold at one price for all sizes.

Padlocks.

The first of April, Padlock manufacturers, without important exception, made a complete readjustment of prices. A classification was effected by which corresponding lines of different manufacturers were brought into practically the same level. The new prices represented little change in Padlocks of the higher grade, but numerous advances in cheaper goods. The market has since been steady in the face of conditions which under other circumstances would probably have led to irregularity.

Shovels.

The year has been a hard one for some Shovel manufacturers, although prices were fairly well maintained during the first few months, especially on the better known makes. Business, however, fell off to small proportions and competition became keen. Late in November the leading makers announced declines of 7½ per cent. on third and fourth grade goods and 5 per cent. on better grades. These changes have led to still lower prices on the Shovels of smaller producers.

Picks and Mattocks.

A new and slightly higher schedule of list prices was adopted last January, but subsequent more liberal discounts represented a decline of about 10 per cent. below the level of a year ago.

Wire Cloth.

In the fall of 1907 a new factor entered the market for Screen Wire Cloth, the American Sales Company, which sells the product of several of the smaller manufacturers. The price was established for delivery prior to February 1 at $1.30 per 100 sq. ft. and was advanced 5 cents for delivery after that date. The market was characterized by noteworthy steadiness and uniformity and opened this fall under the same conditions and on the same level as a year ago. On Galvanized Wire Cloth, Hardware grade, there was a decline of almost $1 per 100 sq. ft. in November, 1907, followed by an advance of 25 cents about February 1, the latter change being largely nominal and made in the interest of the jobbing trade. Some disturbing factors in the market were eliminated during the year and a positive advance of about 50 cents was made this fall, the market on No. 2, 2½ and 3 Mesh Cloth being represented by a quotation of $3 per 100 sq. ft.

Asbestos.

The trade in Asbestos Manufactured Material is referred to as only fair, there having been some falling off from previous prosperous periods, although the panic of 1907 did not appreciably affect the business until months afterward. Raw material experienced no change, generally speaking, in 1908. In the manufactured material prices were higher at the beginning of last year than during the past six months. The market is represented by the following current prices, viz: Asbestos Paper, 3 cents per pound in small lots and 2½ cents in carloads; Asbestos Board, 4 cents in less than carloads and 3 cents in carloads. Air Cell Pipe Covering is subject to the following discounts from a standard list, viz: ½ in., 80 per cent.; ¾ in., 75 and 10 per cent., and 1 in., 75 per cent. discount, and Rope and Wick Packing, 16 cents per pound in any quantity.

Binder Twine.

The International Harvester Company announced its schedule for 1908 on January 22, prices for small lots being 8½ cents for Sisal and Standard; Manila (600 ft.), 11¼ cents, and Pure Manila, 13 cents. About 10 days later the Plymouth Cordage Company announced a schedule of prices in which Sisal and Standard prices were placed ¼ cent per pound below those made by the Harvester Company. The last named company then gave notice of a ¼-cent reduction on Sisal and Standard, to meet the prices made by the Plymouth Company. By the middle of February prices had settled down to a uniform basis, and Western prices were quoted as follows for small lots, with carload lots ¼ cent less, 5-ton lots, ⅛ cent less, central delivery, fall terms:

	Cents per pound.
Sisal	8¼
Standard	8¼
Standard Manila (550 ft.)	9¾
Manila (600 ft.)	11¼
Pure Manila	13

No official change was made in these prices by manufacturers during the season, but a ¼ to ½ cent concession made on one pretext or another was more or less in evidence during most of the season, being made by jobbers and commission men. In spite of some fears to the contrary, due to curtailment of production, there proved to be plenty of Twine to go around, and toward the end of July the market was somewhat irregular, 7¾ to 8¼ cents or lower for Sisal and Standard not being unusual in some sections of the country. The indications point to lower prices for 1909, as the cost of Sisal hemp has been lower, and the price of 7¾ cents for small lots is reported as having been quoted during the latter part of December, 1908.

Poultry Netting.

A steady and uniform market was maintained on Poultry Netting during the season of 1907-'08, the discount to the general trade on Netting galvanized after weaving being 80 and 5 to 80 and 10 per cent. An advance of 2½ per cent. was announced for deliveries subsequent to Feb. 1. Prices for the season of 1908-'09, established last October, were somewhat lower, being represented by a discount of 80, 10 and 5 per cent., with an extra concession on Netting galvanized before weaving. Considerable irregularity developed during the fall because of cutting by jobbers, but efforts to correct this were made by the manufacturers, who announced simultaneously an advance of 2½ per cent. the early part of December.

Roofing and Building Papers.

Prices of various kinds of building papers show an average decline of about 10 per cent, much of which is attributed to lower prices in the waste product, from which they are made. Strangely enough the pinch from panic conditions did not fully reflect itself in this trade until September and October, 1908, previous to which time there had not been an appreciable decline. The prosperous years in this branch were 1906-'07, and by comparison 1908 showed much less volume. A hopeful feeling, however, prevails, and prospects are considered excellent after March, from which month activity in this industry usually dates.

Pipe Cutters.

Prices on competitive Pipe Cutters, Barnes and Saunders pattern, became irregular in the spring and rapidly declined to a low level where they have since remained.

Wood Screws.

No change was made during the year in the base price of Screws, notwithstanding some reported irregularities from the competition of smaller makers. Leading manufacturers have just reaffirmed prices, and expect that they will be well maintained.

Adzes.

A reduction of $1 per dozen in all grades of Adzes was made in the summer by the principal manufacturers.

Screen Door Springs.

Quotations made last summer to the jobbing trade on Perfection pattern Coil Screen Door Springs for this year's delivery showed a decline approximating 25 per cent.

Stove Boards.

A new and higher price-list on Stove Boards was issued by manufacturers about March 1. Although the discount named on this list was greater than before there was a resulting net advance on Boards of about 10 per cent. The regular published discount is 55 per cent.

Scythes.

During the summer leading manufacturers of Scythes discontinued the arrangement under which rebates were paid to the larger trade by a commissioner. Prices for 1909 show a decline of 50 cents per dozen from those ruling in 1908.

Tinware.

Leading makers of stamped and pieced Tinware reduced their prices last January between 5 and 10 per cent. Since that time the quotations of these manufacturers have not been substantially changed.

Rivets.

Low prices were made on boiler and structural Rivets during 1908, but the market stiffened in the fall. An open market prevails on Tinners' and Miscellaneous Rivets, and low prices are made.

Tacks.

Prices on Tacks were fairly steady at the beginning of 1908, but became lower and irregular in the spring, and during the summer were pretty well demoralized. This fall, however, quotations became more regular on a base discount of 90 and 25 per cent., where they are now unusually well maintained for this line.

Copper and Brass Goods.

The first half of 1908 was noticeably weak in the demand for Copper Goods or products based largely on Copper, only pressing wants being specified, while stocks were kept at a minimum. The latter part of February a readjustment of base prices was made from which advances in some instances were made a few months later. Sheet Copper at that period was 17 cents, base; Copper Wire, 14½

cents; Seamless Copper Tubes, 21 cents; Seamless Brass Tubes, 18 cents; Brass Wire, 15¾ cents; Soldering Copper, 19 cents, and Copper Rivets and Burrs, 50 and 10 and 7½ per cent. discount. In July Sheet Copper was the same, Seamless Copper Tubes had declined 3 cents, and Sheet Brass was ¼ cent higher. Early in August Sheet Copper, Sheet Brass and Brass Rods had advanced 1 cent each. Early in November Copper Wire was 1¼ cents higher than in February, while advances of 1 to 2 cents per pound were made in staple Brass Goods.

Chicago Hardware Market.

At the beginning of 1908 the lingering effects of the late panic were still in evidence, being especially marked in the extreme conservatism which continued to characterize all business transactions. Though operating with even less force, perhaps, in Hardware than other lines, the caution here exercised limited the scope of business to the purchase of only such goods and in such quantities as were actually required for current consumption. The practice of anticipating requirements by the placing of forward contracts was almost wholly abandoned. Liquidation induced by the events of the previous year was still in progress and continued until stocks on all hands were worked down as far as it was practicable to reduce them. The wholesome effects of this policy were soon apparent in relaxed stringency of money and better collections, so that early in the year conditions settled back in these respects to a practically normal basis. Business, however, grew slowly in volume, and in order to adjust, as nearly as possible, the rate of production to that of demand, manufacturers began cutting down their output, either by operating intermittently or by running at reduced capacity. Thus the market was to a large extent protected from the burden of overproduction, with its attendant ills. In no section of the country was trade as little unimpaired as in the Middle West, where it was supported by the prosperity of the farming interests. Had consumption been no more affected in manufacturing districts than it was in those distinctly agricultural, the depression of 1908 would scarcely have been of notable importance. The general average of business in Hardware lines in the Mississippi and Missouri valleys was, indeed, not far short of normal.

In the latter half of the year recovery was decisive enough to re-employ much of the idle factory capacity, though it was not until after the Presidential election in November that the greatest gains were realized. Until the issues of the campaign were finally settled business of all kinds was, as is always the case, under additional restraint.

Building.

Not only did the record for building construction in Chicago, as shown by the permits issued in 1908, exceed that of the preceding year, but it overreached the highest limit hitherto established in 1892 as a result of the building boom which preceded the World's Fair. The cost of buildings as thus recorded reached $63,463,000 in that year, as against $68,694,765 for 1908. While several structures of notable size were included in and materially helped to round out this great total, it is observed that the number of buildings was increased out of proportion to the total cost, indicating more activity in the construction of small dwellings and apartments. These conditions which, however, could not be fairly considered as representative of all other Western cities and communities, were reflected in a better local demand for Builders' Hardware. Among the large buildings completed last year were the Corn Exchange Bank, the University Club and the Lyman High School, but the bulk of the business was supplied by the greater number of smaller buildings. Before the end of the year many deferred plans were put into execution, and work upon several important building projects was begun. These include the new City Hall, the Northwestern Depot, the Blackstone Hotel, People's Gas Light & Coke Company's and others which together will require a large amount of Hardware.

Course of Prices.

Distrust as to the stability of prices intensified the conservatism of buyers at first, and at the outset the movement in Wire Nails, Barb and Plain Wire was considerably retarded by the apprehension of a radical slump in values; this was gradually overcome by the continued firmness of prices. A fairly good demand begun to develop, which resulted in a moderate tonnage of orders for spring delivery. As was the case in 1907, Wire and Wire products, though sharing the general effects of depression, continued to hold the lead both in steadiness of movement and regularity of prices throughout the year. The beneficial effects of the price maintenance policy of producers were realized in the opportunity it afforded for liquidations and readjustment required to meet new conditions. Stocks were steadily reduced through the first half of the year, and when in the last week of May a decline of 10 cents a keg on Wire Nails and $2 a ton on Barb Wire were announced, distributers generally were in position to reap the benefit of new schedule without suffering in a corresponding degree from depreciation of stocks on hand. The new prices thus established continued in effect without change through the remainder of the year, and by the time fall trade was in full swing business was back upon nearly a normal basis, so that the year closed with the Wire plants operating to nearly 80 per cent. of capacity.

There was a considerable decline in prices on many goods comprised in Hardware lines, and also more or less irregularity in the maintenance of recognized schedules, but the situation as a whole was remarkably free from extended demoralization. In no former period of depression has there been witnessed a like degree of cooperation between producers, distributers and consumers to prevent the unhappy consequences that must have followed an indiscriminate slaughtering of prices in an effort to effect sales. The moderation displayed in this respect led to quicker recovery than could otherwise have been realized, and at the end of the year there were but few lines that had not made distinctive gains.

Chicago Barb Wire Prices, 1908.

The course of prices of Galvanized Barb Wire in carload lots, Chicago, in 1908, and for several years preceding, averaged from weekly quotations, is as follows:

Month.	1908.	'07.	'06.	'05.	'04.	'03.	'02.	'01.	'00.
	$	$	$	$	$	$	$	$	$
January	2.68	2.39	2.35	2.35	2.64	2.68	3.01	2.95	4.13
February	2.68	2.60	2.40	2.40	2.65	2.75	3.10	3.05	4.13
March	2.68	2.60	2.40	2.40	2.69	2.80	3.10	3.05	4.13
April	2.68	2.60	2.40	2.40	2.70	2.77	3.10	3.05	3.88
May	2.68	2.60	2.40	2.40	2.70	2.75	3.10	3.05	3.13
June	2.58	2.63	2.40	2.40	2.68	2.75	3.10	3.05	3.13
July	2.58	2.63	2.40	2.40	2.65	2.75	3.06	3.05	3.10
August	2.58	2.63	2.40	2.32	2.42½	2.75	3.00	3.05	3.10
September	2.58	2.68	2.41	2.32½	2.20	2.75	3.00	3.05	3.00
October	2.58	2.68	2.45	2.40	2.20	2.75	2.68	3.05	3.00
November	2.58	2.68	2.49	2.40	2.22½	2.75	2.60	3.05	3.00
December	2.58	2.68	2.60	2.40	2.33	2.60	2.60	3.00	3.00
Aver. for year.	2.62⅛	2.64	2.43	2.38	2.51	2.93	2.93	3.04	3.39

Chicago Wire Nail Prices, 1908.

The course of prices of carload lots at Chicago during 1908, and for several years preceding, is shown in the following table, the monthly prices being averaged from the weekly quotations contained in our market reports:

Month.	1908.	'07.	'06.	'05.	'04.	'03.	'02.	'01.	'00.
	$	$	$	$	$	$	$	$	$
January	2.23	2.15	1.94	1.90	2.04	2.08	2.16	2.35	3.53
February	2.23	2.15	1.95	1.95	2.05	2.12½	2.20	2.45	3.53
March	2.23	2.15	1.95	1.95	2.10	2.15	2.20	2.45	3.53
April	2.23	2.15	1.95	1.95	2.10	2.15	2.20	2.45	3.28
May	2.23	2.15	1.95	1.95	2.10	2.15	2.20	2.45	2.53
June	2.13	2.18	1.95	1.95	2.07	2.15	2.20	2.45	2.48
July	2.13	2.18	1.95	1.95	2.05	2.15	2.20	2.45	2.43
August	2.13	2.18	1.95	1.87	1.90	2.15	2.20	2.45	2.43
September	2.13	2.23	1.96	1.87½	1.75	2.15	2.15	2.45	2.35
October	2.13	2.23	2.00	1.95	1.75	2.15	2.05	2.42½	2.35
November	2.13	2.23	2.04	1.95	1.77	2.15	2.00	2.35	2.35
December	2.13	2.23	2.15	1.95	1.78	2.00	2.00	2.35	2.35
Av. for year.	2.17⅛	2.18	1.98	1.93¼	1.97	2.13	2.14½	2.41	2.76

Chicago Cut Nail Prices, 1908.

The following are the Chicago prices for Cut Nails, car lots, during the year:

January	$2.38	July	$2.08
February	2.38	August	2.08
March	2.38	September	2.08
April	2.32	October	2.08
May	2.23	November	2.08
June	2.13	December	2.08

Average for 1908, $2.18¾; 1907, $2.34; 1906, $1.96; 1905, $1.84; 1904, $1.84½; 1903, $2.33; 1902, $2.25; 1901, $2.34; 1900, $2.48.

A Comparison of Retail Hardware Prices.

The tables presented herewith are based upon reports received from a large number of representative Hardware merchants in all parts of the country. These merchants were asked to name their regular retail selling prices on 15 standard articles for which there is a large sale in all communities and which every Hardware store might reasonably be supposed to carry in stock. It was thought that the results of the inquiry would be valuable not only in showing the extreme range of prices and the figures at which the articles were commonly sold, but also in affording a basis for estimating the percentage of profit at which these free selling goods are handled by the Hardware trade. Opportunity is also presented for comparing the Hardwareman's prices with those charged by his competitors, chief among whom must be recognized the catalogue house. Reports are grouped territorially, based on the commonly accepted geographical divisions of the country. In the tables which summarize the prices of the various territories, the headings of the columns may be explained as follows:

HIGH, *is the highest price reported by our correspondents;*
LOW, *is the lowest price reported by our correspondents;*
MOST, *is the price reported by the majority of merchants heard from;*
C. H., *is the price quoted by a leading catalogue house.*

Local Prices vs. Catalogue House Prices.

THE prices of the retail merchants referred to in this review are the local prices in the store or delivered to the customer without charge for freight or express, which must be added to the catalogue house prices, which are f.o.b. Chicago or other point of shipment, the purchaser paying the cost of transportation.

The mail order prices referred to in the tables are taken from a current catalogue of one of these houses. Even lower quotations on some of the articles are made by another catalogue house. In studying the tables, however, it must be distinctly remembered that the mail order house price does not represent the final cost of the article to the consumer who is obliged to pay delivery charges more or less considerable, according to the size and weight of the goods. By way of broadening the comparison the columns of each table have been added, thus giving the aggregate price of all the articles together under the different heads.

Some Very High Prices.

In compiling these figures it was not by any means the purpose to make the comparison unfavorable to the Hardware merchant as opposed to his catalogue house competitor, but unfortunately it is somewhat difficult to escape such a deduction. In some territories the aggregate high price is over 100 per cent. higher than that of the catalogue house, while the average high price for all territories is over 90 per cent. igher. This is a bit disquieting to the friend of the Hardware trade, but may be explained on the ground that the highest prices are exceptional and do not represent the trade as a whole. Based on the aggregate majority price, the comparison is less unfavorable, the average, however, being found to be about 40 per cent. higher than the catalogue house price, which of course does not show the cost of delivery.

A More Favorable Comparison.

A comparison between the catalogue house prices and the lowest prices of the Hardware trade is distinctly favorable to the latter. This shows the average low price for all territories to be only about 8 per cent. above the catalogue house, while if we leave out the Pacific Coast territory, where conditions are obviously exceptional, on account of distance from the market, heavier cost of doing business, &c., the average low price is only about 4 per cent. higher than the catalogue house. On this basis after adding delivery charges, it could probably be shown that the consumer would benefit financially by home purchases, to say nothing of the important matters of convenience, opportunity for selection and quality which are subjects for consideration.

An Extremely Wide Range of Price.

Probably the most notable feature of the tables is the extremely wide range of selling prices, even among merchants of approximately the same class and in the same territory. Some allowance must, of course, be made for variations in quality, but the goods in the list were chosen and specified with the idea of reducing such possible variation to the minimum. On many articles the differences in grade may fairly be said to be inconsiderable. On others there is room for considerable divergence, which must be kept in mind in studying the tables. In naming their prices on these articles some merchants give a range representing grades; others specify "best quality," "guaranteed," &c. On Files some quote lower prices for seconds.

Laying aside the matter of quality, which affects but few of the items listed, the question naturally presents itself, whether among a number of representative merchants there is likely to be a difference in cost sufficient to explain such large discrepancies in selling prices. In these days of keen competition for the trade of the retail merchant this would seem to be improbable. Evidence to the contrary is also found in the fact that the extreme low and also the majority prices are more nearly in line. Even in territories comparatively remote from the market where costs might be supposed to be high the tables show that there are merchants whose selling prices compare favorably with those of the catalogue house.

It would therefore seem fair to conclude that the discrepancies in selling prices represent in the main a variation in profits and that some merchants charge their customers 100 per cent. more profit than others of approximately equal standing and in the same territory.

A second general conclusion of importance has already been suggested, namely, that on representative staple articles the prices of the majority of Hardwaremen are from 35 to 40 per cent. higher than many of their fellow merchants as well as their catalogue house competitors.

Prices in the Entire Country.

	High.	Low.	Most.	C. H.
Common Auger Handles.....	$0.20	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.30	.10	.15	.08
Metal Head Nail Gimlets.....	.10	.03	.05	.03
8-in. Mill File.....	.25	.10	.15	.09
4-in. Taper File.....	.15	.05	.10	.05
10-in. Carpenter's Drawing Knife.	1.25	.40	.75	.53
No. 2 Shingling Hatchet.....	1.25	.35	.75	.45
8-in. Hasp and Staple.....	.25	.05	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	1.00	.40	.50	.48
6-lb. Mattock, long cutter.....	1.25	.40	.75	.44
No. 2 Iron Plate Casters, per set.	.35	.08	.15	.07
1-in. No. 9 Wood Screws, per doz..	.07	.02	.03	.03
1-in. No. 9 Wood Screws, per gross	.50	.14	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	2.00	.80	1.25	.98
Common Sad Irons, per lb.....	.14	.04	.05	.04

In the above table is shown the extreme high price, the extreme low price and the majority price for each article in the entire country, based on the returns received. This is especially interesting from the fact that on quite a number of the articles the extreme low is considerably under the catalogue house undelivered price, showing that

some retailers of Hardware are able to undersell the catalogue house on almost every item.

NEW ENGLAND STATES.

In considering the prices of the New England States it should be borne in mind that much of the Hardware is made in this territory, which is small, not much larger than one average sized Central or Western State. Thus merchants are very close to manufacturers, and selling and distributing expenses are light. The extreme range of prices in New England is comparatively small, the aggregate low being 3.62 and the high 5.86, with the majority about half way between. The aggregate high is lower than in any other section. The low is but 13 cents higher than the catalogue house undelivered price.

Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.15	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.20	.12	.15	.08
Metal Head Nail Gimlets	.10	.05	.05	.03
8-in. Mill File	.20	.10	.15	.09
4-in. Taper File	.10	.05	.08	.05
10-in. Carpenter's Drawing Knife.	1.00	.70	.75	.53
No. 2 Shingling Hatchet	.75	.40	.50	.45
8-in. Hasp and Staple	.12	.05	.05	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.60	.45	.50	.48
6-lb. Mattock, long cutter	.85	.50	.75	.44
No. 2 Iron Plate Casters, per set.	.15	.08	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02	.03	.03
1-in. No. 9 Wood Screws, per gross	.28	.16	.22	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.25	.85	1.25	.98
Common Sad Irons, per lb	.06	.04	.06	.04
AGGREGATE PRICES	$5.86	$3.62	$4.79	$3.49

MIDDLE STATES.

The aggregate low price in the Middle States for the 15 articles is 7 cents lower than the catalogue house. The retail merchants in this populous section probably do on the average a larger volume of business than those in any other portion of the country. Thus they can afford to sell at small profits. Many of them buy at low prices direct from the manufacturers. In this territory department stores are perhaps a larger factor than elsewhere and tend to keep prices down. At the same time the aggregate high price is above New England and nearly 90 per cent. above the catalogue house. As would be expected, the majority price is low, but one section of the country showing a lower figure.

New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.10	$0.05	$0.05	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.22	.10	.15	.08
Metal Head Nail Gimlets	.05	.10	.05	.03
8-in. Mill File	.15	.10	.10	.09
4-in. Taper File	.10	.05	.08	.05
10-in. Carpenter's Drawing Knife	1.00	.60	.75	.53
No. 2 Shingling Hatchet	1.25	.35	.50	.45
8-in. Hasp and Staple	.15	.05	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.75	.40	.45	.48
6-lb. Mattock, long cutter	.80	.40	.75	.44
No. 2 Iron Plate Casters, per set.	.25	.10	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02	.03	.03
1-in. No. 9 Wood Screws, per gross	.30	.16	.20	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.25	.90	1.00	.98
Common Sad Irons, per lb	.08	.04	.05	.04
AGGREGATE PRICES	$6.50	$3.42	$4.41	$3.48

SOUTH ATLANTIC STATES.

It is remarkable that the aggregate majority price for the 15 articles is lower in the South Atlantic States than in any other district, being 4.23, which is only about 20 per cent. above the catalogue house. This speaks well for the Southern merchants, as their territory is not as populous as the Northern or Central States and affords less outlet through factory, building and contractors' trade. The fact that many merchants so situated are able to sell at such a low level has an obvious bearing on the ability of the trade in general who are seriously menaced by catalogue house competition to meet it if they go about it in an intelligent and aggressive way.

irginia, West Virginia, Georgia, North Carolina and South Carolina.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.10	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.15	.10	.15	.08
Metal Head Nail Gimlets	.10	.05	.05	.03
8-in. Mill File	.20	.10	.10	.09
4-in. Taper File	.10	.05	.05	.05
10-in. Carpenter's Drawing Knife.	1.25	.60	.75	.53
No. 2 Shingling Hatchet	.75	.40	.60	.45
8-in. Hasp and Staple	.25	.05	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.75	.50	.50	.48
6-lb. Mattock, long cutter	.90	.50	.50	.44
No. 2 Iron Plate Casters, per set.	.15	.10	.10	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02	.03	.03
1-in. No. 9 Wood Screws, per gross	.28	.15	.15	.14
Mrs. Potts' Sad Irons, No. 55, set.	2.00	1.00	1.00	.98
Common Sad Irons, per lb	.05	.04	.05	.04
AGGREGATE PRICES	$7.08	$3.71	$4.23	$3.49

CENTRAL NORTHERN STATES.

This is the enemy's country, so far as the catalogue house is concerned, and we naturally find some merchants selling at very low prices. The aggregate low price for this district is 3.23, which is the lowest figure touched in the this district is 3.23, which is the lowest figure touched in the country—25 cents lower than the catalogue house unthat the high prices aggregate 6.44, which is 100 per cent. above the low and nearly 100 per cent. above the catalogue house. These figures emphasize the great divergence in the selling prices of merchants similarly situated, and point to a fundamental difference in the policy of conducting a retail business. Granting, as it is reasonable to do, that the merchant who charges high prices must sacrifice some trade, and conversely that low prices tend to increased volume, some merchants apparently take the ground that they can make the most money by securing a high percentage of profit on what they do sell; others mark their goods much nearer cost and depend on the accumulation of small profits arising from a large volume of business. From the fact, which has already been pointed out, that the majority prices are much nearer the low than the high extreme, it would appear that the latter policy is more generally followed in the trade, and that Hardwaremen who charge exorbitant profits on staple articles are the exception rather than the rule.

Ohio, Michigan, Indiana, Illinois and Wisconsin.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.15	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.20	.10	.15	.08
Metal Head Nail Gimlets	.10	.03	.05	.03
8-in. Mill File	.20	.10	.15	.09
4-in. Taper File	.10	.05	.05	.05
10-in. Carpenter's Drawing Knife.	1.00	.40	.75	.53
No. 2 Shingling Hatchet	1.00	.40	.60	.45
8-in. Hasp and Staple	.10	.05	.05	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.60	.40	.60	.48
6-lb. Mattock, long cutter	1.00	.50	.75	.44
No. 2 Iron Plate Casters, per set.	.25	.10	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02	.03	.03
1-in. No. 9 Wood Screws, per gross	.28	.14	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.35	.85	1.00	.98
Common Sad Irons, per lb	.06	.04	.05	.04
AGGREGATE PRICES	$6.44	$3.23	$4.73	$3.49

NORTHWESTERN STATES.

The wide range of prices in the Northwestern group of States may be explained in part, no doubt, by the unusual variation in conditions which in Iowa, Minnesota and even in Nebraska are widely different from those in Wyoming and Montana. At the same time it is probable that in this as in other sections some allowance must be made for variation in quality of goods. Some merchants may not have quoted on their cheapest articles of the kind, or may not carry as cheap a line as others. On the other hand, it is not unfair to assume, basing the assumption on general experience and actual investigations, that the mail order goods which are offered at very low prices are the cheapest that can be bought, and indeed are a little below the quality of the cheapest goods handled by the trade. In the Northwest we find some prices that compare well with catalogue house figures, the extreme low being only about 23 cents above them, or about 1½ cents on each item. Here, as elsewhere, it is probable

that some merchants make a point of carrying cheap goods on which they can meet the catalogue house prices.

Iowa, Minnesota, Nebraska, North Dakota, South Dakota, Wyoming and Montana.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.15	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.25	.10	.15	.08
Metal Head Nail Gimlets	.10	.05	.05	.03
8-in. Mill File	.25	.10	.15	.09
4-in. Taper File	.10	.05	.10	.05
10-in. Carpenters' Drawing Knife.	1.00	.60	.75	.53
No. 2 Shingling Hatchet	.90	.50	.75	.45
8-in. Hasp and Staple	.20	.05	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.75	.40	.50	.48
6-lb. Mattock, long cutter	1.25	.60	1.00	.44
No. 2 Iron Plate Casters, per set	.25	.15	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02	.05	.03
1-in. No. 9 Wood Screws, per gross	.50	.20	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.50	.80	1.00	.98
Common Sad Irons, per lb	.07	.05	.05	.04
AGGREGATE PRICES	$7.32	$3.72	$5.15	$3.49

GULF AND MISSISSIPPI STATES.

Prices in the Gulf and Mississippi States are more uniform than in any other section, and show a smaller range than any other group. The aggregate high price is the lowest shown in any territory except New England, a surprising thing in view of the fact that these States are not close to the market and are largely agricultural in character, and the sales of retail merchants probably do not as a rule run to large volume.

Kentucky, Tennessee, Alabama, Mississippi and Louisiana.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.15	$0.10	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.20	.10	.15	.08
Metal Head Nail Gimlets	.05	.05	.05	.03
8-in. Mill File	.15	.10	.15	.09
4-in. Taper File	.10	.08	.10	.05
10-in. Carpenter's Drawing Knife.	1.00	.65	.90	.53
No. 2 Shingling Hatchet	1.00	.45	.60	.45
8-in. Hasp and Staple	.10	.05	.05	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.60	.50	.55	.48
6-lb. Mattock, long cutter	.75	.50	.60	.44
No. 2 Iron Plate Casters, per set.	.15	.10	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.03	.05	.03
1-in. No. 9 Wood Screws, per gross	.44	.23	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.25	1.00	1.25	.98
Common Sad Irons, per lb	.05	.05	.05	.04
AGGREGATE PRICES	$6.04	$3.99	$5.00	$3.49

SOUTHWESTERN STATES.

This territory is far from the market, much of it thinly populated and largely given up to agricultural pursuits. Trade centers are few. Naturally the general run of prices is high, the aggregate of the majority being 5.25, a figure only exceeded on the Pacific Coast. Still, we find some merchants whose prices are low, the extreme low being less than 10 per cent. above the catalogue house.

Missouri, Arkansas, Texas, Kansas, Colorado, New Mexico and Oklahoma.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.15	$0.05	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.25	.15	.15	.08
Metal Head Nail Gimlets	.10	.05	.05	.03
8-in. Mill File	.25	.10	.15	.09
4-in. Taper File	.15	.05	.10	.05
10-in. Carpenter's Drawing Knife.	1.25	.50	.75	.53
No. 2 Shingling Hatchet	1.00	.30	.75	.45
8-in. Hasp and Staple	.15	.05	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	.85	.50	.60	.48
6-lb. Mattock, long cutter	1.25	.60	.75	.44
No. 2 Iron Plate Casters, per set.	.30	.11	.15	.07
1-in. No. 9 Wood Screws, per doz.	.07	.02½	.05	.03
1-in. No. 9 Wood Screws, per gross	.40	.17	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	1.75	1.00	1.25	.98
Common Sad Irons, per lb	.10	.04½	.05	.04
AGGREGATE PRICES	$8.02	$3.70	$5.25	$3.49

PACIFIC STATES.

On the Pacific Coast conditions are so different from those in any other territory that the figures can hardly be taken at their face value. The cost of getting goods out there is alone sufficient to necessitate a heavy advance in selling prices. Then the selling expenses of the jobbing trade are abnormally heavy because of high traveling expenses, &c. The volume of business within the reach of the general run of retailers outside of the few important cities is small as compared with that enjoyed by merchants in the populous towns of the Eastern and Central States. At the same time the table shows that there are some merchants west of the Rockies whose prices are about the same as the majority of the trade throughout the country. Here are the prices of a merchant in a small town in the State of Washington:

Common Auger Handles	
Com. Double Spur Auger Bits, ¼ in.	20
Metal Head Nail Gimlets	5
8 in. Mill File	15
4 in. Taper File	10
10 in. Carpenter's Drawing Knife	65
No. 2 Shingling Hatchet	65
8 in. Hasp and Staple	10
3 Tine Hay Fork, 5 ft. Str. Hdl.	60
6 lb. Mattock, long cutter	75
No. 2 Iron Plate Caster, per set	15
1 in. No. 9 Wood Screws, per doz.	5
1 in. No. 9 Wood Screws, per gross	25
Mrs. Potts' Sad Irons, No. 55, per set	140
Common Sad Irons, per lb.	4

Following is the table of prices representing Pacific Coast States:

Arizona, Oregon, Washington, Idaho, Utah and California.

	High.	Low.	Most.	C. H.
Common Auger Handles	$0.20	$0.10	$0.10	$0.04
Com. Dbl. Spur Auger Bits, ¼ in.	.30	.15	.15	.08
Metal Head Nail Gimlets	.10	.05	.10	.03
8-in. Mill File	.25	.12½	.15	.09
4-in. Taper File	.10	.10	.10	.05
10-in. Carpenter's Drawing Knife.	1.25	.65	.85	.53
No. 2 Shingling Hatchet	1.25	.50	.75	.45
8-in. Hasp and Staple	.20	.15	.10	.04
3-Tine Hay Fork, 5-ft. Str. Hdl.	1.00	.50	.60	.48
6-lb. Mattock, long cutter	1.25	.75	.75	.44
No. 2 Iron Plate Casters, per set.	.35	.15	.15	.07
1-in. No. 9 Wood Screws, per doz.	.05	.02½	.05	.03
1-in. No. 9 Wood Screws, per gross	.40	.20	.25	.14
Mrs. Potts' Sad Irons, No. 55, set.	2.00	1.25	1.25	.98
Common Sad Irons, per lb	.14	.04	.07	.04
AGGREGATE PRICES	$8.84	$4.64	$5.42	$3.49

Price-Lists, Circulars, Etc.

Manufacturers in Hardware and related lines are requested to send us copies of catalogues, price-lists, &c., for our Catalogue Department in New York; and at the same time to call attention to any new goods or additions to their lines, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.

MAINE MFG. COMPANY, Nashua, N. H.: 1909 catalogue illustrating and describing the company's line of White Mountain Refrigerators and Ice Chests for use in residences and by grocers and butchers. These goods are made in both pine and hardwood. A considerable part of the catalogue is devoted to the company's line of Stone White Refrigerators, the side walls, back and bottom of which are lined with slabs of stone, hand polished to a perfectly smooth finish. Some of the Refrigerators in each line are finished with round corners.

GARLAND NUT & RIVET COMPANY, Pittsburgh, Pa.: Price-list of Rivets, Riveting Burs, Bolts, Nuts and Galvanized Pump Chain.

CORDLEY & HAYES, 172 Duane street, New York: Catalogue relating to Twentieth Century Bottle Coolers, Collapsible Cooler Stand, Bottles and Demijohns.

E. H. WATSON & Co., 18 North Sixth street, Philadelphia, Pa.: Illustrated catalogue and price-list No. 2, devoted to Pliers and Nippers, Halter Chains, Folding Rules, Nail Sets, Gimlet Bits, Needles, Trowels, Grass Shears, Cold Chisels, Cast Hammers, Hatchets, &c.

GOULDS MFG. COMPANY, Seneca Falls, N. Y., and 16 Murray street, New York: Illustrated matter describing Admiral, Monarch and Vice-Admiral Pumps for hand and power spraying.

Store Arrangements of the Fowler & Sellars Company.

THE building erected and recently occupied by the Fowler & Sellars Company, White Plains, N. Y., has a frontage of 40 ft. on Railroad avenue, with an L 20 x 62 ft. The main building is five stories high, the basement and first floor being 140 ft. deep by the full width, and the floors above are 100 ft. The structure is built of brick, with granite front, and the upper stories are of Harvard brick with granite trimmings.

Construction.

The first floor ceiling is 15 ft. high and is fitted with shelf boxes and side wall and showcases. The first and second floors are of reinforced concrete with iron girders,

Fig. 1.—Sporting Goods Department.

supported in the center by a row of iron columns, making these two floors fireproof. The second story has a deck floor, the concrete extending up the walls 6 in., making it water tight, and 2-in. iron pipe outlets extend through the side and back walls, making a water tight roof over the salesroom. In case of fire on any of the upper floors, this arrangement would protect the goods on the first floor from damage by water. The upper floors are of

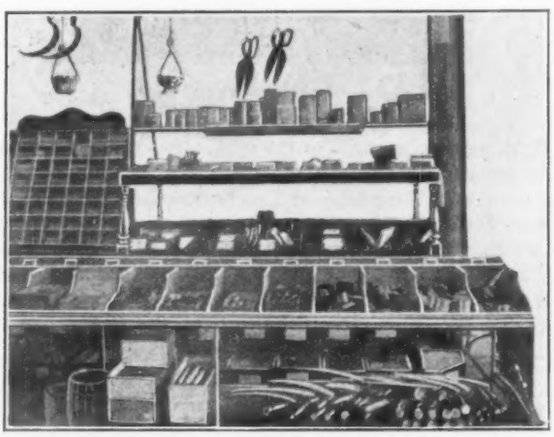


Fig. 2.— Summer Goods Rack.

wood with iron girders and columns. The rear and side windows are fitted with wired glass and protected by iron shutters or bars.

The plumbing and tin shops are located in the 20 x 62 ft. L. The tin shop is on the same level as the main floor, and connected with it by a door. The shop is divided from the main floor by a brick partition to keep all shop noise from the main floor. The dividing wall is built with arches, so that the room used for the tin shop can easily be thrown into the main floor if occasion should require. The plumbing shop is in the cellar immediately under the tin shop, from which it is reached by stairs.

The building is equipped with a combination passenger and freight elevator of the hydraulic plunger type. The stairway of the main floor is of ornamental iron with slate treads. The two show windows, with entrance

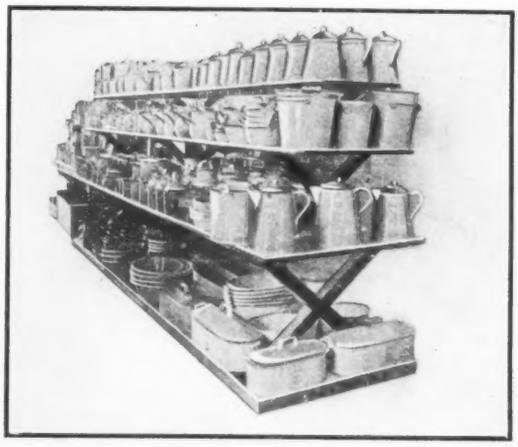


Fig. 3.—Enameled Ware Stand.

between, are of plate glass with copper frame of Grecian design, with prismatic glass above the plate glass. The back of the show window is of plate glass divided into three large sash, with panel work below. The center sash is hung on weights and slides up to admit of goods being put in the windows. The woodwork is mahogany; the vestibule is also fitted in mahogany, with Tennessee marble base and moasic floor. The entrance doors are two pairs of double acting swing doors with panels of

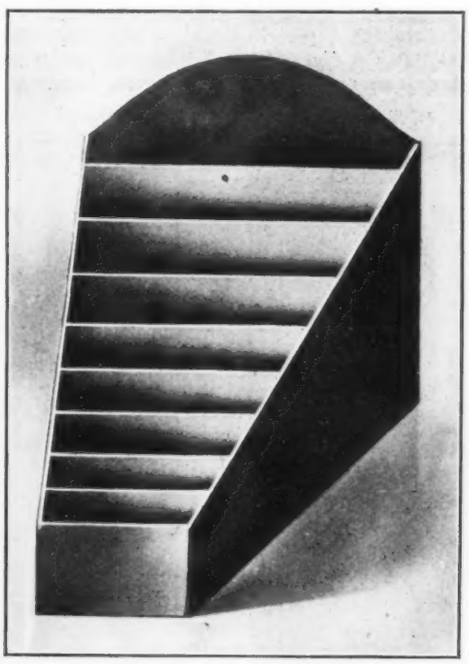


Fig. 4.—Tray Box.

plate glass on either side of each door. Over the doors and panels are plate glass transoms. The entrance and windows together are one of the show features of the store.

Sporting Goods Department.

The company does a large business in Sporting Goods as the result of carrying an extensive and varied line, which is given a prominent place immediately back of the show window on the left hand side of the entrance. Cases and shelving representative of this department are shown in Fig. 1. The wall case contains Jointed Rods, with Boxing Gloves, Hunting Knives and Base-

balls on shelves. Hanging are Key Chains, Indian Clubs, Dumb Bells and Racquets. The showcase in front is provided with two shelves, the top one narrow and the lower one somewhat wider. On the top shelf are displayed Bait, Spoons, Compasses, Whistles, &c. On the lower shelf and bottom of the case are Lines, Bobs,

Fig. 5.—Range Display.

Reels, &c. The section of shelving next to the wall case is used for Cartridges and Shells, and the open section beyond contains Baseball Bats. Above the Shells are Baseball Gloves and Mitts. Under the Cartridges and Bats are drawers devoted to Revolvers, Revolver Holst-

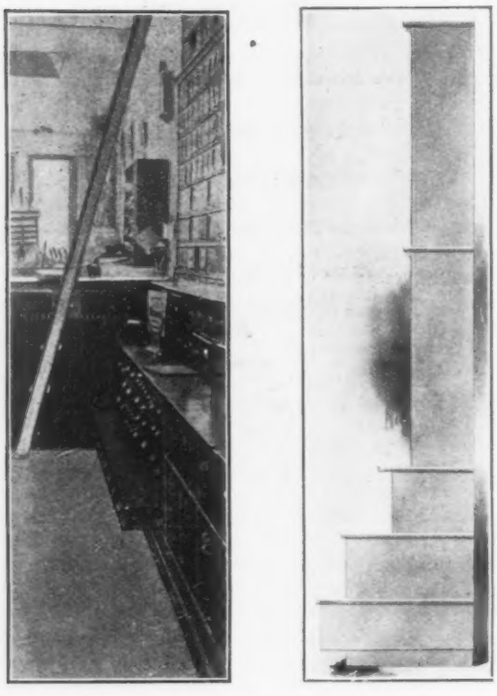


Fig. 6.—Step Shelving.

ers, Gun Cleaners, Drinking Cups, Watches, Key Rings, Blanket Pins, Ice Creepers, &c. Drawers under the ledge contain Skate Straps, Flags, Dumb Bells, Shin Guards, Shot, Fish Hooks, Sinkers, Rod Fixtures, Masks, Gloves, Dog Muzzles, Air Rifles, &c.

The main floor is virtually divided into two parts by the row of columns through the center, and this division is made more pronounced by the character of goods kept on either side of this imaginary line.

Summer Goods Rack.

Opposite the Sporting Goods section are accommodations for summer goods, shown in Fig. 2. The rack shown in the foreground is made up of two sections, each 9 ft. long, only a portion of one section being shown in the illustration. The platform base is 4 in. high, with an open space of 13 in. between the top of the base and the under side of the shelf above. The shelf is supported by pipe standards, nickel plated, imparting

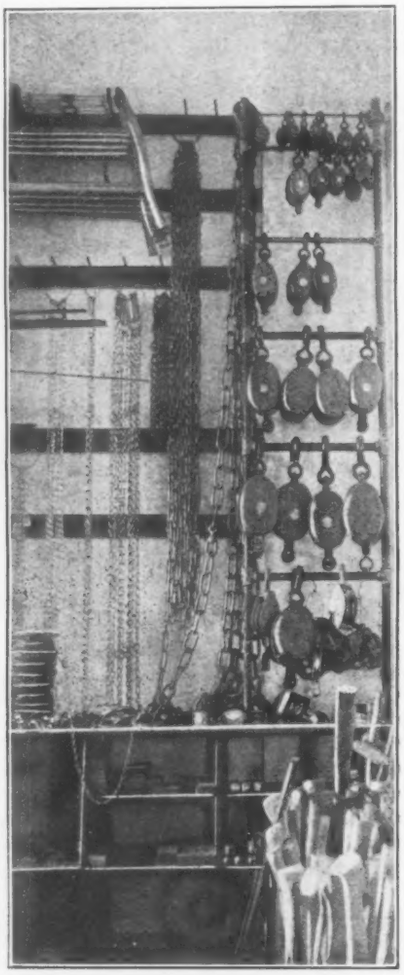


Fig. 7.—Block Rack and Chains.

a light, airy appearance to the rack. The shelf is divided into compartments, each of which are 7½ in. wide, 15 in. deep and 7 in. high at the back. Card frames are fastened above the compartments for names and prices of goods. In the compartments are carried Grass Shears, Trowels, Pruning Shears, Hose Nozzles, Weeding Hooks, Asparagus Knives, Masons' Lines, Plant Sprayers, Insect Powder Guns, &c. On the base are Grass Hooks, Scythe Stones, Mole Traps, Sprayers, &c. This brings a large variety of articles suitable for gardeners' use within a comparatively small area and displayed so they can be easily seen and examined. Back of the rack is a counter with a passageway between it and the rack, upon the left hand end of which is a case containing garden seeds and papers. The balance of the counter is devoted to boxes containing peas in boxes standing on the base, above which are Seeds in packages on a shelf supported by turned spindles. On a shelf above this one are insecticides and fungicides, including Lice Powder, Whale Soap, Bordeaux Mixture, Paris Green, &c. Hanging on a pipe rack above the upper shelf are Pruning Saws, Sprayers, Toy Garden Tools, &c. The Goods which are closely related to those on the rack are thus conveniently grouped near them.

Cutlery Showcase Not Obtrusive.

In the rear of the rack is a handsome horseshoe shaped showcase, containing a large assortment of Cutlery. As first placed it was given the usual place of prominence in the front center of the store, opposite the entrance. But it appeared to the proprietors so cold and forbidding from an agricultural point of view that it was feared no farmer could ever be induced to enter the store, as the shining Cutlery showcase would be the first thing to strike his eye, so it was relegated to a position where it would be less conspicuous.

Enameled Ware Stand.

The special feature of the display stand, Fig. 3, for holding Enameled Ware, which is in the rear of the Cutlery case, is the cross legged supports. They permit of a view of the entire length of the rack without obstructions and eliminate the necessity of other supports for the shelves. The rack is 13 ft. long, with supports made of 2½ x 2½ in. stuff. The top shelf is 21 in. wide, the next one 28 in. and the lower one 40 in. wide. As the base is easily accessible the capacity of the rack is large.

Box for Trays.

The tin box with partitions shown in Fig. 4 is used for holding oval japanned trays. It is home-made and painted red. It is 11 in. wide at the front end and 22 in. wide at the back. The front is 6¼ in. high, and the back is 22 in. high, while the length on the base is 22 in. It is divided by tin partitions into eight compartments of the following widths, commencing at the front: 2, 2, 2¼, 2½, 2½, 3, 3 and 3 in. Another compartment could be added at the back to accommodate trays 24 in. wide.

Range Display.

In Fig. 5 is shown the arrangement for displaying sample Ranges, in the rear of the Granite Ware stand, the idea being to provide a suitable background. At present this is simply boards painted white, but the design is eventually to have a background of white tile. The vacant space at the right of the picture is to show a Range complete with high warming closet and hood.

Step Shelving.

The right hand side of the store is devoted to Shelf and Builders' Hardware, Tools, &c., for the accommodation of which shelf boxes and wall and show cases are provided. In Fig. 6 a portion of the step shelving is shown, the sectional drawing to the right emphasizing particularly the space beneath the lower row of drawers. This makes an opening 3 in. high and 6 in. deep for the feet of salesmen, so that the lower boxes above the upper step can be reached without difficulty when standing on the floor. This could not be done if the lower row of drawers reached to the floor.

Tackle Block Rack.

At the rear of the shelving are the offices, and beyond is a rack for farm and garden tools. Between the rear end of the offices and the front end of the tool rack is the arrangement for carrying Tackle Blocks, shown in Fig. 7. This is made of iron pipe 1¼ in. in diameter, with five cross pieces 20 in. apart. The extension of the tool rack, to the left of the Blocks, is devoted to Wood Saws and Chains.

(To be concluded in our next issue.)

Automobile Show of Licensed Manufacturers.

THE ninth National Automobile Show, will be given in the Madison Square Garden, New York, January 16 to 23, inclusive, under the auspices of the Association of Licensed Automobile Manufacturers. The official list of exhibitors contains 294 different displays, about 40 more than at any previous exhibit. The exhibits have been departmentized to assist visitors in locating readily what most interests them. There will be 47 exhibits of complete cars, 221 exhibits of accessories and parts, and 26 motorcycle exhibits, the latter the most comprehensive and complete in the history of motor cycles.

E. G. Kitts has succeeded Kennedy & Kitts, Connellsville, Mo., and will carry Shelf and Heavy Hardware, Stoves, Tinware, Paints, Oils, Sporting and Athletic Goods.

Graef & Schmidt.

THE firm of Graef & Schmidt, 107 Chambers street, New York, dissolved by limitation, December 31. A co-partnership has been formed by Hermann Kind and Fritz Beckmann, the latter managing director of the firm of J. A. Henckels, Solingen, Germany, who will continue to carry on the business of marketing the Henckels cutlery as sole agents in the United States and Canada. Mr. Kind, cousin to William R. Graef, has long been the active partner in New York in the conduct of the business.

Some reference to Mr. Graef, who founded the business here, December 1, 1883, may be of interest. Early with the house of Peters Bros., in Chambers street, who were importers of German cutlery made abroad by themselves, he remained with them for 13 years, the house retiring from business in 1884-5. Mr. Graef's partner, Carl Schmidt, was with the same house for 11 years. At the beginning of Mr. Graef's business life, in 1865, he was with the old house of Howard, Cary & Sanger, who then occupied the entire building at 105-107 Chambers street, running through to Reade street. They dealt largely in fancy goods, notions, &c., Mr. Graef having charge of the cutlery department.

The business of J. A. Henckels, Solingen, Germany, was founded in 1731, when the Twins brand trade-mark was granted. The house manufactures large lines of pocket knives, table cutlery, scissors, razors, cork screws, nail files, manicure goods, swords, daggers, carvers and about everything covered by the word cutlery, including many curious articles entirely unknown in this market, but made for other foreign trade centers. The product in this country goes principally to the fine retail trade selling cutlery and Hardware, guns, jewelry, and stationery.

The Warren System.

THE J. D. Warren Mfg. Company, Chicago, Ill., has just issued an artistic souvenir book of 150 pages, illustrating its well-known line of Hardware store equipment. A portion of the elegantly printed volume is devoted to illustrations showing the application of the Warren system in stores in this and foreign countries. The selection of fixtures, arrangement of stock and manner of sampling in one of the finest of American Hardware stores, as shown, was worked out by the company with the annual inventory as a guide. Another portion of the book shows detached shelving, both open and with shelf drawers, with goods or samples in place; also wall cabinets, cases, counters, glass door and display bases, &c. Many of the illustrations are in colors. A number of pages are devoted to suggestions, descriptions, details of construction, &c., based on the company's 12 years' study and experience in Hardware store equipment. This elaborate work is a distinct advancement on the former trade literature issued by the company.

Whitman & Barnes Mfg. Company.

THE Whitman & Barnes Mfg. Company, Chicago, Ill., and Akron, Ohio, has leased at 64 Reade street much larger quarters than those previously occupied in New York City. This branch in the future will be in charge of Clarence I. Markham, well known to the trade in this line of goods. The store has been overhauled and renovated to adapt it to the carrying of a complete stock of goods, adequate in assortment and quality to supply the wants of customers in the territory embraced by the New York house—the Atlantic seaboard to New Orleans. The company is also putting in a new plant at St. Catherines, Ontario, where it has long maintained a factory for the production of goods for the Canadian market.

The Arnett Hardware Company, Greenfield, Ill., handling a line of Hardware, Stoves, Pumps, Harness and fine Vehicles, has been succeeded by the Melvin & Sons Hardware Company.

LETTER FROM E. C. SIMMONS.

To the Editor: I take pleasure in accepting your kind invitation to write for your first issue of 1909. It appears to me that the Hardware dealers of the country are at present more inclined to read carefully the communications in your valuable journal than ever before. They seem to be looking for information—matters of interest and general discussions of newer and more up to date methods; something that will uplift and help the business in general—and especially so as we are now drawing to a close one of the most unfavorable and depressing business years in our line (Hardware) that has been known in this country. It seems fitting, therefore, that I should give you my impressions of the "signs of the times" as I see them, so far as they relate to the Hardware business and the commercial interests of this country in general.

Trade Seeks Education.

Comparative Effects of the Panic.

During the past year, when I have several times visited the East, I was strongly impressed with the fact that the panic was felt much more severely there than it was in the North, Northwest or Southwest. It appeared to me as though the manufacturing industries of New England, New York and Pennsylvania were under the depressing shadows of Wall Street's influences, whereas the agricultural sections—the great productive regions of the West, Northwest and Southwest—were, comparatively speaking, but lightly touched by the panic of 1907. Up to about July 1 we were doing about two-thirds of our normal business—in volume; that is to say, 66 2-3 per cent. of the business of the same period of 1907, which, as you know, for the first 9 or 10 months of last year (1907) was the best and largest this country has ever experienced. Beginning about July 1 we began to improve—we commenced to slowly climb the hill of prosperity—so that by December 1, in this section of country, we had—substantially speaking—got back to a full volume of business—about the same that we did for the corresponding period of 1906, at which time everything was in a normal and healthy condition; therefore, the comparison is a fair one.

West Lightly Touched.

Back to Normal Conditions

Reports from Different Sections.

As you know we have a number of branch houses, which fact enables us to be better informed on the general condition of commercial affairs than others who are not so fortunately situated. The New York branch has not yet fully recovered the large and active business it was doing previous to the panic, but it has done so in great measure during the past 60 days. On the other hand, Toledo, Minneapolis, Sioux City and Wichita have entirely recovered. They began by August 1 to show as large, if not a larger business, than heretofore, and during the closing two months of the year they showed an increase of from 20 to 30 per cent. over any business they had ever done previously. The St. Louis house is doing about the same business in volume that they did in 1906, but in some respects it is better, because there are but few staple goods in our sales of the past 60 days.

Record of Last Two Months.

A Sanguine View of 1909.

The large crops of 1908, together with the abnormally high prices of farm products, have given the agricultural sections great buying power. While we received some of the benefit from that during the past year that benefit was small in proportion to what we will receive during 1909. I confidently believe that we will, inside of 30 or 60 days, be right back again up to the top notch of commercial activity. The shelves of the retail Hardware merchants are not much more than half full—they have postponed their buying on account of the fear they still have of panic effects. They want goods and they want them quickly. The demand with us for the past 60 days has been so very large that in it we see a clear indication of a heavy volume of business commencing almost immediately with the dawn of the New Year. One year ago we were unable to take future orders in any considerable quantity; at the present time our futures are larger and greater in volume than ever before in our experience.

Great Buying Power.

Goods Will Be Wanted.

Market Prospects.

As I reason this out it appears to me that since the manufacturers, with but very few exceptions, have made no money during the year 1908, and since the great demand will come almost immediately after the opening of the New Year, which demand they will hardly be able to supply promptly, there will be some advance in prices—not any great advance, but still there will be constant evidences of advanced prices in varied lines of goods; nor is there the slightest reason to believe there will be any declines. I seriously doubt if there will be any advances in the near future on staple or heavy goods. I am confident there would have been but for tariff agitation, but now that the question of tariff revision is so prominently before Congress it would appear to be exceedingly lacking in diplomacy if the manufacturers were to advance prices, which would be taken very naturally by Congress as an irritant, or a "slap in the face," and would probably react upon those manufacturers whose products were under consideration. Our house confidently believes there will be no declines in prices, and that there will be quite a number of advances. As soon as we determined that fact to our own satisfaction we placed our orders for, substantially speaking, all the goods that we expect to need up to July 1, 1909, being convinced that in so doing we stood a chance to gain something, even if it were only a small per cent. in the way of advances, and the probability of loss was confined simply to the interest on an extra large stock, which would probably be more than offset by the great advantage of having a complete stock, enabling us to execute orders more promptly and completely than heretofore.

Some Advances Expected.

Effect of Tariff Agitation.

A Proof of Confidence.

We Have Made Known Our Policy

and the action we have taken, through our traveling salesmen. We want our customers to know what we think of the market and the prospects for the immediate future, and how we back our judgment with our money; nor have we hesitated to express our views to manufacturers and their agents. We reasoned it out that if other jobbers followed us it would be a good thing for business in general, and hasten the return of business activity in full measure; hence, we should be very glad indeed if others did the same. On the other hand, if they did not, then we would have a larger and more complete stock than others, and that would be to our advantage—so that either way the thing worked we felt it not unwise to let our policy become known—not in any blowing or blustering way, but simply to, as far as in us lies, lend the power of encouragement to others to have confidence in the immediate future. We have arrived at these conclusions largely because we have enjoyed such an excellent business in November and December—during every day of which, and also every hour, we have been pushed to our utmost to execute orders promptly, and we have at work a very large and full force. During the past 60 days there has not been a man, woman or child in our employ but who has exerted himself (or herself) to the utmost to keep up the work. We confidently expect to jump right into a big business and a good business immediately following New Year's. Hence, we have not allowed our stock to run down—as is our custom—for annual inventory; on the contrary, we have increased it, and have a much larger stock, in proportion—in fact, we have our warehouses full to over-

Lending Encouragement.

Everybody Busy.

flowing—having absolute faith in the favorable outlook for business in the immediate future.

The Profession of Salesmanship.

Nineteen hundred and eight has been a most interesting year to me personally, because I have been entertaining myself, as well as occupying my time, in following up some of my hobbies—one of which is to encourage better salesmanship, believing that salesmanship is in a sense a profession. I think it is a very laudable and proper ambition for any man on the road to try to be a better salesman this year than he was last, to make every effort to be a better salesman in 1909 than he was in 1908, and the only question is how to bring about the desired result.

Room for Improvement.

I have also felt that there was much room for improvement in salesmanship in the conduct of the retail Hardware business. Some of your readers will remember that I made an address before the National Retail Hardware Convention, held in St. Louis last March, and I endeavored to incorporate in that some "pointers" which if followed up might be helpful to many merchants. Those pointers related chiefly to two things—better salesmanship and being better collectors. I regard these two as of such vital importance that I am going to trespass on the time of your readers to ventilate both still further in this communication.

Importance of Making Collections.

I am sorry to say there is still quite a class of retail Hardware dealers who lack "commercial courage"; that is to say, they appear to be afraid to ask their debtors for the money, even if it is long past due. During the past year I have received quite a number of voluntary communications, or letters from merchants, thanking me for the allusion I made in my address last March to the necessity of of a Hardware merchant being a good collector. In some cases the parties have been profoundly grateful. One man who came to see me said, "You have saved my life, financially speaking. I was doing business on the old-fashioned 'befo' the war' basis, letting people impose on me, and I found that many of them when they owed me money would not come to my store to buy any more goods, because they were afraid I would dun them; therefore, they would go elsewhere, and the very thing I thought I was doing, viz., holding their friendship and trade, I was not doing; on the contrary, I was losing their business." I can see

Commercial Courage.

Mistaken Idea.

Evidences of Some Improvement

in this matter; still, there is room for great improvement. I do not believe that any retail Hardware business in this country can be successfully conducted unless it is on the basis of prompt collections, and I most earnestly ask the retail Hardware trade to give this matter careful thought to see if they cannot make some improvements in their methods of business for 1909, and the time to commence is right now.

The Place for the Proprietor.

My other hobby is that of having a desk near the front door. I do not mean to have the office there for bookkeeping purposes, but a cheap flat desk in the front—not a roll top—is, in my mind, one of the best investments you can make. Then let one of the proprietors occupy that desk for such time as he can spare for the purpose—all the time, if he can, or half the time, if he cannot spare it all, but especially the mornings, so that he can greet the customers as they come in—so he can give them the glad hand of welcome as they enter his household—his business house I mean. There are many advantages in this plan. Some merchants seem to think that by so doing they would have to wait upon the trade themselves, and they haven't time for that. That is not at all necessary. After you have greeted your customer—passed the time of day with him, and found out what he wants, you can call a salesman or clerk to wait upon him, and the whole time you have given him probably does not exceed three or five minutes, but you have conveyed a pleasant impression—you have given him a cordial welcome, and you have made him feel at home.

Flat Top Desk.

Cordial Welcome.

Plan Adopted with Good Results.

Quite a few of our customers have adopted this plan, and I have taken pains to ascertain how they liked it after trying it. In every single case where the method has been put into practice, the merchant is pleased with it—finds it not only pleasant but profitable, and I have thought it best to reproduce here three of the letters that I have received upon this subject—giving the names, dates and addresses, so that if there are any who have any doubt on the subject, and who may desire further information, they can write to some of these practical, intelligent and successful Hardware merchants, and ask them such questions as they may desire.

Pleasant and Profitable.

Three Letters.

The first letter comes from J. A. Plummer, who at the time I made my address last March, was president of the Retail Hardware Association of the State of Arkansas. He is a man of recognized ability and great influence in his own State. His letter is worthy of careful reading:

MARIANNA, ARK., December 17, 1908.

Mr. E. C. Simmons, St. Louis, Mo.

DEAR MR. SIMMONS: I want to thank you for the practical advantages I have derived from the address you delivered last March to the National Retail Hardware Association at its meeting in St. Louis. Among the many good ideas and suggestions that you made, I was most enthused with "the head of the house having his desk right at the front of the store," where he could meet every one coming in to the store and give them the "glad hand." The very first thing I did on my arrival home from the meeting was to have things cleared out right at the front of the store, and my desk brought out of the office. I soon realized that it was the right thing, and as my desk was a "roll top" behind which I was to a certain extent hid, I ordered a flat top desk, so I could see and be seen better. It is now nearly nine months since I made this change, and every day shows me that it has been of great advantage. I have sold more goods, made more friends among my customers, made new customers, got more in touch with the business and customers, and also with my clerks, and have managed to collect quite a lot of little accounts by seeing the parties that I would not have seen were I "back in the office." The boys may make almost as many changes in the arrangement of the store as they think proper, except they must not put me back in the office, and they see the benefit of the "desk in front."

This one idea of the many good ones advanced by you has many times over paid what time and money I was out in attending the St. Louis meeting.

I think the talks I have had with my clerks, telling them of your suggestions, &c., as to salesmanship, have increased their value to me to a great degree. In one instance, one of my young clerks was hardly able to hold his position—the talks to him have made quite a change for the better, and I shall give him an increase in salary on the 1st. Good words and ideas continue to grow and expand so that one can hardly calculate the ultimate good they do.

I am glad to know that you continue in good health and fine spirits.

With best wishes for your continued health and happiness, I am, as ever, Your friend,

(Signed) J. A. PLUMMER.

The next letter is from J. C. Jones of Manhattan, Kan., a very successful merchant, who not only knows what he is talking about, but who is quite up to date, and, as he says to me in a private letter, a reader of *The Iron Age*, from which he gets much benefit. His letter is quite instructive, and cannot fail to be interesting to any Hardware dealer who will read it carefully:

Now Knows Cash Customers.

MANHATTAN, KAN., December 16, 1908.

Mr. E. C. Simmons, St. Louis, Mo.

DEAR SIR: I have been using my desk near the front door for about eight months. Your salesman had frequently suggested that my place was in the front end of the store. I was doing my own office work, but finally decided to employ a girl for the office and I took a desk directly opposite the front door and 20 ft. back from it. Since using this front position I am enabled to see who comes into my store personally, and know who is trading with me. Prior to this I only knew the most of my customers by the charge tickets which came back to the desk every night. The cash customers were lost to me, as I would not be likely to meet them in front, and the cash register does not disclose the names of customers.

Again, being in front, I can hear the conversation be-

tween clerks and customers. This often gives me pointers in various ways. One hears inquiries for goods which may or may not be in stock, thus giving a better idea of the stock to buy. There are many advantages in being up front, and in my opinion that is the place for the storekeeper to be.

Yours truly,
(Signed) J. C. JONES.

The third letter is also from a Kansas merchant, O. Gossard of Oswego, who hits the nail on the head most emphatically when he says that if he had $1,000,000 he would consider the warm greeting of all who entered his door the best part of his working capital. That is a splendid sentence, and his letter is a clear testimonial as to the value of a front desk, which enables the merchant to give the glad hand of sympathetic friendship to all who enter and to treat them as honored guests.

A Warm Greeting Best Working Capital.

OSWEGO, KAN., December 26, 1908.

Mr. E. C. Simmons, St. Louis, Mo.

MY DEAR SIR: It so happened that I was a very poor lad, financially, when I came in from the country (where I was working for Fourteen a month) to enter into competition with those fellows who had money, and I with only a smile and a good hand-shake, placed my resources all at the *front*, and if I had a million to-day I would consider the warm greeting of all who entered my door the best part of my working capital. In fact, it is a great pleasure for me to in some way greet every one just as soon as they enter my door. I couldn't be induced to get away from the entrance to my store, and I consider the proprietor the best man for the place.

Yours truly,
(Signed) O. GOSSARD.

Perhaps some of your readers may smile when they see such things as this, and wonder why I am giving my time to them. Therefore, I will say that I have no part in the management of this business now, having given that up to younger hands more than 10 years ago, but I still come here every day when I am home and try to make myself useful, taking up any part of the business that I think will be of general benefit, believing most thoroughly that anything which benefits the retail Hardware trade is of distinct, practical and visible benefit to this company, because its success depends wholly and absolutely upon the success of the retail Hardware dealers, who have supported us these many years and enabled us to build up this magnificent institution.

Dissatisfaction and Progress.

During the past year I have received a great many letters, and some of them from perfect strangers—merchants who did not trade with us, but who were in the Hardware business—asking me questions about how to conduct the Hardware business successfully. This has given me a great deal of pleasure and entertainment, making answer to these, and I regard it as a good sign. People are not satisfied to go along in the old groovy, machinelike way, they want to progress; they are seeking light and information, and I know of no avenue that they can apply to which is so valuable as *The Iron Age*—it has most interesting and instructive communications from week to week.

May Learn from The Iron Age.

Helping to Shorten the Depression.

We have been actively engaged for the past year in doing what we could to hasten the return of prosperity. We never for a moment thought that we could bring it back, but we thought we could help to shorten the period of depression, and the events of the year clearly convince us of the correctness of that view, because it is a well recognized fact that no country in the world has ever heretofore recovered from any great business depression or panic in less than from three to five years, and I confidently believe that within 18 months from January 1, 1908, this country will be entirely free from the effects of the panic. The only industries or interests that are still behind are those of mining, lumber and railroads, but all of those are gaining in a very satisfactory manner.

Wonderful Recovery.

Relations of Retailers and Jobbers.

The fact that the retailers and jobbers are getting closer together—are harmonizing their views so perfectly and pleasantly, and working in "double team," as they are now, is a splendid sign of the times. I think it fair to say that the jobbers of this country—practically all of them—have listened attentively and respectfully to all requests made by the retail Hardware dealers, through their associations, and have arranged their business in harmony with the ideas so expressed. There is, however, a little lack of consistency on the part of the retail dealers toward the jobbers. They have asked a great deal of the jobbers—most of which was based upon good, common sense and correct ideas—perhaps all of it was; the jobbers have granted it, and have been loyal to the retail dealers; but on the other hand, I raise this question: Have the retail dealers been loyal and consistent with the jobbers? I don't think that a jobber has any business to sell a consumer—no matter how much the quantity may be—and I am confident that practically all the jobbers of this country are entirely consistent in this matter; that is to say, they refrain from selling consumers, and confine their business to merchants only. They also have refrained—with one accord—from selling catalogue houses and other competing elements which hurt the retail dealer. On the other hand, I ask: Are the retail dealers confining their purchases to jobbers? Alas! they are not, as a whole. It appears to me some of them are inconsistent—they ask from the jobber all the protection they need or can think of, and he gives it to them—he has reponded freely; on the other hand, some of the retailers seem quite ready to place their orders with the manufacturer when some silver-tongued salesman comes along, and in his seductive manner presents the subject, and takes the order, which is almost invariably for from three to five times as many goods as the merchant needs, or as he would naturally buy from the jobber. It appears to me this is inconsistent, and I confidently claim that it is unhealthy. I don't think there is a retail dealer in this country but who can buy from a jobber at as low a price as he can from a manufacturer. I know we are always willing to compete with anybody—whether he be manufacturer or jobber—whenever it is fair fighting. We like to play the game of competition and play it read hard, but we always play fair—we do not believe in any "below the belt" methods.

Lack of Consistency.

Confining Purchases to Jobbers.

Jobbers' Prices Are Low.

Reciprocal Demands.

There are three classes of Hardware interests—manufacturers, wholesalers (or jobbers) and retailers. The proper function for the manufacturer is to sell to the jobber only; the jobber to the retailer, and he should keep his hands off (absolutely and completely) of consumers. Does it seem unreasonable that we should ask the retailers to remain loyal to the jobbers, especially as they can buy from the jobbers at the same price they can from the manufacturer, and of this there is no doubt. Almost any first-class jobbing house in this country will meet factory prices, freight added. Let us consider the line of Cutlery. The salesman from a Cutlery manufacturer comes along, and persuades the retail dealer to give him his order, and when he places it he buys from two to five times as many goods as he would naturally do from the salesman of the jobber, who is nearby, who has just as good goods, and perhaps better, who has a far better line of goods—a greater assortment and more attractive patterns than any one single manufacturer. It appears to me there is every reason in the world why the retailers should remain loyal to the jobbers, and I strongly urge them to do so for mutual benefit. Let them ask all they please of the jobber that is consistent with good business, and let the jobber grant it, and be just as loyal to them as he possibly can, but play fair, please, gentlemen; be loyal yourselves to the jobber when you ask him to be loyal to you as retailers.

Mutual Loyalty.

Hardware Business Methods Have Improved.

There is no doubt in my mind but what there is a vast improvement in the methods of conducting the retail Hardware business during the past five years. Stocks are kept better—neater, cleaner, arrangements and displays

are far superior, advertising is being done—a great deal of it. There are very few retail stores but what have gotten out a Christmas sheet or catalogue of some kind, containing Christmas goods, and in that way entered into competition with the department stores, who have too long been allowed to monopolize this desirable part of the business.

Approaching a Prosperous Era.

As I look at it, we are just approaching a remarkably prosperous business era in the history of this country. What a wonderful change in sentiment in 12 months! A year ago business was prostrated, industry was paralyzed, credit curtailed, capital frightened, thousands of worthy people who wanted work could not get employment. To-day the commercial sun is shining brightly, confidence is with us in full measure; most of the money that was in hiding in safety deposit boxes, old stockings, chimney corners, bureaus, stoves and other places has come out and been put into circulation; factories are running on full time, and the wheels of industry are revolving most rapidly. Has any other country in the world ever shown any parallel to this? Certainly not.

Public Attitude Toward Corporations.

The greatest progress that has been made during the year, as I view it, is the change in public sentiment toward railroads and large corporations. When the world-renowned $29,000,000 fine was assessed against the Standard Oil Company it hit this whole nation a blow of depression that set it back, commercially speaking, several months. The higher courts have reversed that and in no uncertain tones explain why they did so. For a little while it seemed as though the Standard Oil Company's name was an ogre, and the mere mention of it was enough to frighten all the children of the land so they would run behind the curtains and draw them over their faces for fear the spectre of Mr. Rockefeller or Mr. Rogers or some other Standard Oil magnate would appear before them and frighten them. Now people are calmly reviewing the situation, they recognize there are a great many more credits to be entered on the side of the Standard Oil Company's work than there are debits. It is true they have done a great many bad things, but haven't they done a great many good things? Indeed they have. They have been a great benefit to this country in many ways. Why not speak of the favorable side of human nature while we are speaking of the unfavorable side.

Magnates No Longer Ogres.

Soaking Railroads Has Become Unpopular.

Demagogic, unwise and harmful, in fact, vicious, legislation against railroads, such as was distinctly in evidence a year ago, has entirely ceased. It is now decidedly unpopular for a man to talk about hitting or "soaking" railroads, because whenever that is done people realize it is hurting labor, and when you hurt labor you hurt the whole people of the United States. It has become a well recognized fact that the prosperity of the world depends upon the condition of affairs in the United States, and that the condition of affairs in the United States depends absolutely upon the prosperity of the railroads; hence it is fair to say that the railroads of the United States are the determining factor in the prosperous condition of the world. Frighten capital and you paralyze business; frighten capital and you prevent the railroads from selling their securities, and, therefore, railroad improvement and expansion ceases.

Hurting the Whole People.

Business Men Should Form Public Opinion.

Is it not high time that the business men of the United States should recognize that it is their duty to form public opinion, because if they do not do it somebody else will, and unfortunately that somebody else will be the "muck raker" and the "demagogue"? We are on better times; things look better in many respects. The lessons of the panic have been exceedingly valuable; perhaps it is worth all it cost us. It has taught us to see many of the errors of our ways. New economies and better methods have been put into our business lives, more care and conservatism in the conduct of our affairs is visible on every hand. Prosperity is at our doors. Let us all pull together; let's all grasp the towline of prosperity and heave ahoy! heave ahoy! until we get to the top of the hill again.

Panic Lessons Valuable.

E. C. Simmons

One Hundredth Anniversary of J. M. Warren & Co.

J. M. WARREN & CO., Troy, N. Y., have issued an attractive booklet commemorating the one hundredth anniversary of the founding of the business which occurred in 1809. The booklet is embellished with a number of portraits of men who have been identified with the concern, together with several views of premises which have been occupied. The title of the original house was Hart & Nazro, who were succeeded by Hart & Pitcher in 1821, after the store and stock had been destroyed by fire in 1820. After several subsequent changes in personnel Joseph M. Warren entered the firm in 1840, and in 1855 the style was changed to J. M. Warren & Co., which it has remained ever since, although incorporation papers were taken out in 1887.

Goodell-Pratt Company's New Catalogue.

THE Goodell-Pratt Company, Greenfield, Mass., has issued catalogue No. 9, containing 272 pages. It describes not only the extensive line of carpenters' and machinists' tools and labor saving devices included in previous editions, but a large number of new tools and machines now shown to the trade for the first time. An index of the new tools fills page 3 of the catalogue, and is followed by an alphabetically arranged index of the entire contents.

Requests for Catalogues, Etc.

The trade is given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses, with whom manufacturers may desire to communicate:

FROM F. M. SPEGAL, who has recently engaged in business in Arnold, Neb., and is handling Shelf and Heavy Hardware, Stoves, Tinware, Housefurnishings, Implements, Paints and Sporting Goods.

FROM THE FILER HARDWARE COMPANY, successor to Tripplett & Reynolds Hardware Company, Filer, Idaho, which carries Shelf and Heavy Hardware, Stoves and Tinware, Housefurnishings, Implements, Paints, Sporting Goods and Furniture. R. A. Reynolds, who has been connected with the former company for 10 years, has a half interest in the Filer Hardware Company.

THE BOSTON PRESSED METAL COMPANY, Worcester, Mass., states that owing to the number of inquiries received for them, it was necessary to discontinue the series of monthly calendars, the distribution of which began with the opening of 1907. Announcement is now made that the company is in a position to supply the December number as well as other back issues to all who make application for them. A new catalogue lately issued of the Osborne Adjusters will also be forwarded on request.

NOTWITHSTANDING the fact that 1908 has been a discouraging business year, the Norvell-Shapleigh Hardware Company, St. Louis, Mo., followed its usual custom of making every one of its employees a Christmas present of two weeks' salary, announcing the fact in a kindly note of holiday greeting.

FACTORY COST AND BUSINESS METHODS.

RECORDS AND METHODS IN ESTIMATING AND CONTRACTING.

First Article.

IN these articles a description is given of the methods pursued by a large contracting firm in figuring estimates and bids, recording costs and in making records concerning work solicited or contracted for. It is obviously exceedingly desirable to be able to estimate on projected work with substantial accuracy, as it is ordinarily necessary to figure low to secure the contract and equally necessary to avoid making a bid at a figure which will fail to yield a profit or perhaps entail a loss. The methods adopted by progressive and successful manufacturers in thus keeping their records are of definite, practical interest. How to do it most effectively is not a simple problem, as no fixed rules can be laid down nor any definite methods be prescribed on account of diversity of conditions and variety of circumstances. The methods adopted by those who have given careful attention to the subject and whose practice is in accordance with up to date business principles will, however, be suggestive to those who are desirous of improving their own factory and business methods. With this in view we lay before our readers a description of the manner in which a well-known contracting firm with power plant handles requests for quotations and the business methods and records connected with the execution of an order.

Keeping Track of Estimates.

When a request is received for a price or estimate the blue prints, letter and specifications are stamped

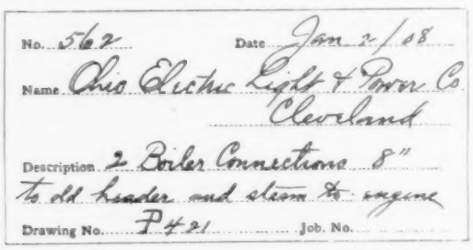

No. 562 Date Jan 2/08
Name Ohio Electric Light & Power Co.
Cleveland
Description 2 Boiler Connections 8"
to old header and steam to engine
Drawing No. P#21 Job. No.

Fig. 1.—Card for Indexing Estimates.—Actual Size, 5 x 3 In.

with the date of receipt and a number. The number is one of a series running consecutively and known as the estimate numbers. Each number is entered on two cards similar to Fig. 1. One of these cards is arranged numerically, and the other filed under the name of the job. It will be observed that space is provided for a minute description of the work, and for the drawing numbers as well as the job number in case the estimate is accepted.

Estimate Sheets.

The goods appearing on the blue print or memorandum are next drawn off on to sheets similar to Fig. 2. These sheets measure 30 x 36 in. On the top, it will be seen, are spaces for necessary data obtainable from the specifications. The body of the sheet is ruled for the classification of material and the labor to be done in the shops. Spaces are provided for the piece price and extensions. Toward the bottom are places for probable transportation and erection expenses, together with the total, contingencies, profit and bid made the customer. On the bottom of the sheet are written the names of the clerks doing the figuring, and the estimate numbers. If the estimate is accepted the space marked "job number" is filled in. The estimate index cards are also marked with the job number if the bid is accepted. The job number will be explained later.

Estimate Data Handy for Reference.

The proposition to be sent the prospective customer is made out in duplicate on suitable forms provided. The

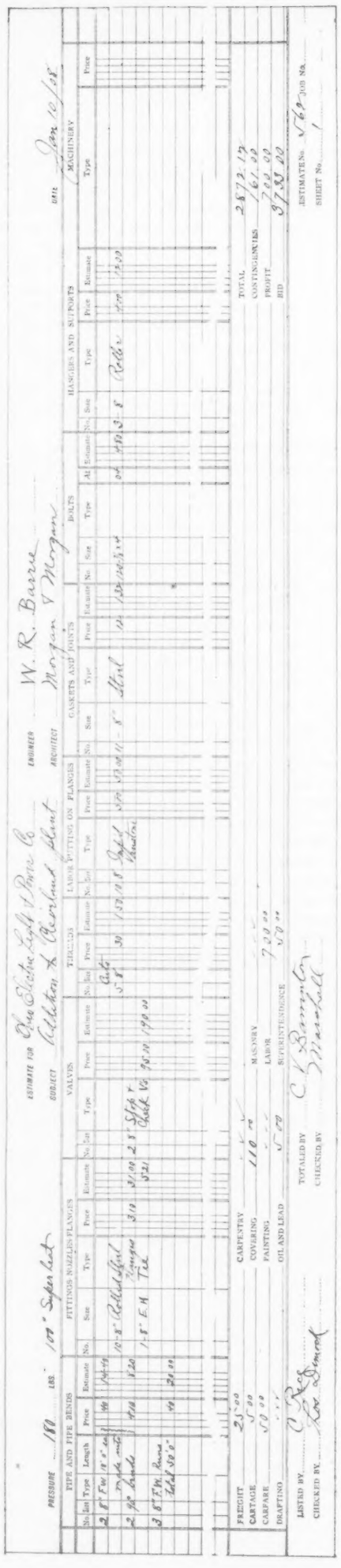


Fig. 2.—Large Sheet for Complete Estimate.—Actual Size, 30 x 36 In.

duplicate is filed alphabetically and bears the estimate number, together with the job number if accepted. The forms referred to simply provide the stereotyped headings and introductions for the different departments of the work to be done, such as "boiler leaks" or "feed water line."

The estimate sheets are filed numerically in drawers, and the blue prints, requests, &c., are placed in large envelopes arranged to harmonize with the estimate numbers. Correspondence relating to prices on material

Dep't Accounting No. of copies made 4 Dict. by J.E

No. 476 Ohio E.L. & P. Co.
Cleveland

Est. No. 562 Customer's Order No. 12746 Req'n No. 2431 Dated Jan. 15/08

Ship to Excelsior Contracting Co. Via Ky. C. & St. L.
% Ohio E.L. & P. Co., Cleveland

Freight ~~Collect~~ Prepaid C L rate 20¢ per 100 Lbs. Less than C L rate 26¢ per 100 Lbs. Min. C L. 30,000 lb

Notice of Shipment to Ohio E.L. & P. Co.

2 Copies of Bill to W.R. Barre Brooklyn, Ky

N. Y. O. ..... D. R. ..... A ..... B ..... C .....
Contract ~~Open Order~~ ~~Commission~~ F. O. B. ~~Works~~ Destination
Extra on ..... Price $ 3733.99 Billed 7/28/08
Detail list will ..... be made only for this order.
Shipment commenced 7/16/08 Completed 7/28/08
Cost made up .....
Complete shipment promised 7/10/08
Complete erection promised 7/30/08

Additions to power plant piping
Detail in blue prints

Fig. 3.—General Shop Order.—Actual Size, 11 x 8 In.

which must be obtained from outside sources is also placed in the envelope until settled. If prices are obtained from a number of firms on valves, for instance, all the replies are attached to a copy of the original request which was sent to the competing houses. When a price

CUSTOMER Ohio Electric Light & Power Co.
JOB NO. 476 ESTIMATE NO. 562
LOCATION Cleveland
ENGINEERS W.R. Barre CONTRACT PRICE $ 3733.00
CONTRACT SIGNED 4/15/08 STARTED 4/1/08 COMPLETED 7/28/08
SUPERINTENDENT T. Johnson BOILER H.P. 1000
FOREMAN J. Muldoon ENGINE H.P. 600
TYPE OF WORK High Pressure

	ESTIMATED COST		ACTUAL COST	
SHOP MATERIAL	1245	00	1246	24
OUTSIDE MATERIAL	352	00	412	10
LABOR	700	00	650	00
EXPENSES	100	00	85	00
FREIGHT AND CARTAGE	30	00	35	52
COVERING	110	00	110	00
CARPENTRY AND MASONRY	"	"	50	00
DRAUGHTING	"	"	10	00
CONTINGENCIES	161	00	135	00
TOTAL	2872	12	2763	80

SPECIFICATIONS 4/7/08

Fig. 4.—Cross Index of Shop Order and Record of Estimated and Actual Cost.—Actual Size, 11 x 8 In.

is accepted the letter making the best quotation is stamped "accepted," with spaces provided for the date, name of job, estimate and job number, and filed regularly. The other quotation letters are marked with the name of the job and estimate number and are also filed. The copy of the request for prices is marked with the name of the job, and filed under that heading. It also bears the names of the firms ot whom the request was sent and their respective prices, as well as the job and estimate numbers.

Ease in Locating Quotations.

Thus it is easy to locate any particular quotation, as this serves the purpose of a price cross index on any particular job. The latest quotation sheets are always kept on file for use in figuring costs of goods on the estimate which it will be necessary to buy.

Shop Orders.

When a proposition is accepted a general shop order is made on a form similar to Fig. 3. These orders are numbered consecutively, the number given being known as the job number, which is placed on all papers as previously explained. Four copies are made—one for the shop, one for the foreman who supervises the erecting, one for the accounting department, and one to be filed numerically according to the job number in the estimating department. It will be noticed by reference to the cut that the first few lines pertain to information required for shipping. Below this are three vertical columns. The first contains spaces for the cost to be charged to each department. This is not filled in until the job is completed. The second column contains information necessary for billing. The last column relates to the laying out of the work in the shop. The blank space at the bottom of the sheet is left for a general description of the job. The detail is furnished, as explained later by the drafting.

Cross Index of Shop Orders.

The shop orders are cross indexed using a form similar to Fig. 4, and arranged alphabetically. It will be observed that while the card acts as an index to both estimate and job numbers it also affords a comparison of the estimated and actual cost. This is both interesting and useful in determining probable expense in future estimates. Should one wish to look up an estimate sheet having only the job number he can easily locate it by referring to the shop order on which will be found the estimate number. The same is true where only the name of the firm is known, since by referring to the comparative cost card the estimate number can be found.

Estimate Accepted.

On acceptance of the estimate a general shop order is issued, the job if a large one is summarized as to amount and sizes of material, stock is looked up and if necessary orders are issued for material lacking.

Record of Stock.

Here it is proper to refer to the record of stock, which is kept by the card system. Fig. 5 shows the card used. The cards are arranged alphabetically accord-

MAX. 3372 MIN. 1000 ORDER AT 2200 MATERIAL 7/8 x 4 Hex. Head Iron Bolts No. 37

AM'T ORDERED	DATE	AM'T REC'D	DATE	AM'T DEL'D	DATE	AMOUNT ON HAND
2500	1/15	1570	1/20	2000	1/25	1870
		1000	2/1		2/1	3370
2600	2/1			400		1370
						2370
						1970

Fig. 5.—Stock Record Card.—Actual Size, 5 x 3 In.

ing to the name of the stock on the card. The data given on the upper left hand corner is used in ordering material. The first two columns contain the amount ordered and the date. The next two give the amount received. Both are helpful in rushing forward back orders. Cards showing stock below the minimum have a clip at the top. These are attached until the stock is adequate when the clip is removed. The next two columns are used for stock delivered. The last column is necessary to show material on hand. It is always balanced when material is received or delivered. A well kept stock effects a great saving in time and money, as it is unnecessary if stock is properly maintained to take down a machine working on a given size because the stock has run out. The importance of examining the stock when a large job is anticipated will be clearly apparent.

The order having been thus accepted, the remaining articles will relate to the execution of the order and the various blanks and forms used in connection with its progress through the shop.

PROFIT SHARING PLANS.

IN view of the interest in the subject of profit sharing, we give below a communication recently addressed to F. D. Mitchell as secretary of the American Hardware Manufacturers' Association, by Cornelius S. Loder, 154 Nassau street, New York. Mr. Loder has given special attention to profit sharing plans and submitted his views on the subject at the request of the association:

First of all I wish to tell you and the members of the association that within the past year I have written to every concern, both here and abroad, whom I have been advised has had experience with profit sharing plans. Their replies have been interesting, showing that in nearly every instance their efforts have been unsuccessful. This would be discouraging were it not for the fact that when I went into the subject further and visited some of the American concerns who have discontinued profit sharing plans and analyzed the reasons for their failure, they were easily explained and accounted for. I am more firmly than ever convinced after each study of failures that a profit sharing plan rightly conceived, properly installed and tactfully operated will create a better feeling among the wage earners and also increase earnings. The concerns which have adopted and are now using profit sharing plans are pleased with the results. Upon examination many advantages have been revealed, such as the elimination of strikes, better understanding between themselves and their employees, and larger gross and net earnings, as a direct result of the profit sharing system.

Sound Economic Principles Govern.

It must be thoroughly comprehended at the outset that profit sharing is not an arbitrary system but one that rests upon sound economic principles which have had strong advocates for over a century. Failures have largely been the result of blindness to the principles involved, resulting in timidity or in a disposition to force conditions. Thorough knowledge of the economic laws involved and of local conditions backed by a broad minded willingness to accept the best plan in industrial affairs are essential to success. Its great advantages are that it places a business on a sounder basis by eliminating a number of causes of trouble and by increasing the efficiency and good will of the employees.

Three Factors and Three Sides.

There are three factors to be considered in profit sharing plans, namely, the capitalist, the employer and the employee, and any one of the three that is not cared for will not permit the plan to succeed. There are also three sides to a profit sharing plan, namely, devising, installing and operating, and these must be given due consideration before the plan can be pronounced successful.

Possibly it is not necessary that a definition of profit sharing be given, excepting to say it is a division of the profits amongst all who share in their production.

Failure in the Past Due to Lack of Study.

Profit sharing has been and is to-day misunderstood. The benefits to be secured through it are neither recognized nor appreciated except by a very few. Its failure in past efforts has been largely due to the fact that there has been no one who has made a thorough study of the problem, and hence no one who could give expert advice and assistance along these lines.

As to the successful undertaking of a profit sharing plan first of all the business must be thoroughly analyzed with reference to the cost of the product, the selling plan and other technical facts, so that it may be ascertained what it is capable of doing.

The relationship between the company and its men must be gone into very thoroughly. This plan needs the highest kind of expert service and assistance. Failures have been largely due to leaving this feature of the work to bookkeepers or others incapable of appreciating the difficulties to be encountered in making so important a change in the policy of the business.

After all that has been referred to has been done by the outside man, then the plan should be thoroughly discussed with the officers and executives of the business, including the superintendent and foremen.

Informing the Employees.

Some arrangement should be made whereby the employees are informed as to the operation of the plan through a committee of their own selection, acting in conjunction with another committee from the executive side with the additional service of the outside man, so that the employees may have every assurance that the employers do their part as agreed, and that no opportunity for criticism or fault finding can arise.

Service of an Intermediary.

In the operating of the plan it has been found best that the employees with their committee and the employers with a similar one agree to the service of an intermediary, or that the outside man continue in an advisory capacity to both interests. In some instances it has been found better for each side to retain its own accountant who will do no more than declare to the men that the plan to which they have agreed has been lived up to in its entirety. Of course, no confidential phases of the business need be disclosed.

It is surprising to what an extent a rightly designed and operated profit sharing plan will bring the men into closer and friendlier touch with their employers. The labor unions sometimes oppose a profit sharing plan. When they do it is an indication that they are afraid it will make the men friendly to their employers!

Hibbard, Spencer, Bartlett & Co's. Salesmen's Convention.

AS an initial step in formulating the business campaign of the year about 200 traveling salesmen of Hibbard, Spencer, Bartlett & Co., Chicago, will meet in annual convention at the company's headquarters on January 4, 5 and 6. The first day will be devoted to an inspection of the American Steel & Wire Company's Wire and Nail mills at Joliet. A special train will take the party, which will also include a number of officers of both companies, down in the morning, and the whole day will be spent in explaining and demonstrating to the salesmen the processes of manufacture of the various Wire products. The entire party will be the guests of the American Steel & Wire Company for the day, and experienced men will be in attendance to explain each step of the work and furnish such information as is desired. On Tuesday and Wednesday all day educational sessions will be held in the assembly hall of the store, at State and South Water streets. It is designed that these meetings shall be instructive upon all points connected with the selling of goods, and to this end talks will be given by officers of the company, heads of departments and some of the older salesmen. In addition to these there will be addresses by prominent manufacturers, among those who will speak being Frank E. Baackes and J. D. Warren. While meetings of like character have been held in former years, the attendance this year is considerably larger than that of any former gathering.

BILLY JONES—ADVERTISING MANAGER.

BY WESTMOUNT.

"HAVE you had any previous experience in advertising, Mr. Jones?" asked the president of a large Eastern jobbing house, the occasion being Jones' application for the job of advertising manager.

"Yes, sir. I've been at this sort of thing for about 5 years, and in all kinds of businesses. My last position was with one of the largest daily papers in the country, where I was kept busy chasing up and writing copy for almost every kind of proposition under the sun."

"Ever had any kind of experience with a Hardware firm?"

"Not particularly, sir, although I've written lots of stuff for manufacturers of many of the lines you handle."

"Well, I don't suppose it matters particularly. I've heard that to an advertising man all lines of business look alike."

"That's the way we look at it, sir, and I have no fear of not being able to make good here if you will give me a trial."

"What salary do you want?"

"A thousand dollars a year to start."

"That's a little heavier than I'm prepared to pay, just at present, as I'm taking all the risk of you not making good. I tell you what I'll do. This is the first of September. I'll give you a trial till the end of the year at the rate of $800. If you make good by then I'll give you $1000. If you don't make good you get out."

"Will you put that in writing, sir?"

"Yes."

"Very well. I'll take a chance on it."

* * * * * * * * * *

At Work.

"Now, Mr. Jones, I haven't got any particular instructions to give you, as I intend to leave you pretty much to yourself. If you will look over the ads in your office for the past couple of years, you will see the kind of copy we are in the habit of running. Most of the ads are my own ideas, which have been worked up by your predecessors. I only employ a man to do this work because I haven't the time to devote to it myself.

"I have had a list of the mediums we use prepared for you and also the days the copy has to be ready. I think that's about all, with the exception that you are under me personally. Don't take orders from anybody else and don't hesitate to ask my advice at any time. You'll always find me here."

* * * * * * * * * *

Jones was not one of the big bright stars in the advertising game, but he had good common sense and considerable experience. He could take up a newspaper and improve on three-quarters of the copy it contained. He had twentieth century ideas and his heart sank when he looked at the past efforts of his firm at throwing away its money. The ads were all of the old school type—illustrations and headings that had no relation whatever to the articles to be sold—and by the looks of most of them Jones decided that whoever wrote them must have done so with an open dictionary in front of him. Were the firm's ads the only ones in the paper they might have sold some goods, but where so many firms were making a bid for business they were almost worthless.

"Well, Billy Jones, old boy, you are certainly up against it good and hard, this time. To make good here I have to please the old boy, and to please him I have to keep on putting trash in the papers that will ruin my reputation as an ad writer for good and all. I'll be hanged if I do it! Yes, I will, too! I'll go on in the old way till the end of the year, get my raise and then start in to make things hum. If I can't bring the old boy to my way of doing things then——, well, I'll get out, because it's better to be out of a job with a fairly good reputation as an advertising man, than to hold this job with no reputation."

* * * * * * * * * *

Running Along in the Old Way.

The end of the year came and Jones was informed by the boss that he had made good and would get his raise to the $1000 mark. He had carefully studied the firm's methods of advertising and just followed along in the same old rut. It often made him feel bad when friends in the newspaper offices criticised his work and asked why he didn't employ more up-to-date methods in producing his copy. He knew that most people thought he was just a "piker" and didn't know how to turn out a good, convincing, business pulling ad, but he was too loyal an employee to knock his boss, even to put himself on a better footing with scores of acquaintances in his own line of business.

When the boss called him in at the end of the year and congratulated him on the way his work had been done and informed him that his salary for the coming year would be $1000, he felt ashamed of himself and inclined to have it out with the old man then and there. His better judgment, however, somewhat assisted by thoughts of the many knocks he had borne in silence bade him wait a while longer.

Everything went fairly well until the effects of the panic which had occurred shortly after Jones took over his duties with the firm began to make themselves felt. Business grew worse and worse as the winter wore away, and the old man's only thought seemed to be to reduce expenses. Still the sales dropped, and Jones began to think about holding his job and earning his salary. He realized that it was up to him to have it out with the old man now, no matter what happened.

* * * * * * * * * *

A Straightforward Talk.

"Mr. Scott, if you can spare the time, I'd like to talk things over with you, and see if we can't come to some better arrangement in regard to the firm's advertising. Things are so bad now that something has to be done."

"I realize that fully, my boy, but I've done about everything possible to keep the business on a paying basis, and I'll confess to you that I've about reached the end of my rope. However, if you have any ideas of your own that you think would help us along, I'll be only too glad to listen to them."

"Well, sir, in the first place, I have a confession to make."

"A confession to make? One would think you were a criminal to hear you talk."

"I feel like one, sir, because I haven't been earning my salary since I came here."

"You haven't been earning your salary? Do you realize what you are saying, Mr. Jones? You are casting a slur upon my ability as a business man. Do you think I would have kept you here if I thought you were not earning your salary? I know what you have been doing, and I know what I have been paying you, and you may rest assured that if I had thought you were not earning it your salary would have been reduced long ago. Don't worry, my boy. If it will do you any good to know what I think, I will tell you that you are the best advertising man I have had yet. You have enough brains to carry out my instructions and work up my ideas and that's all I require."

Coming to the Point.

"That's where the trouble is, sir. I am taking $1000 a year from you and following your instructions like a $7 a week clerk, when all the time I have realized that the advertising I have been turning out has been almost worthless."

"What! Do I hear correctly, Jones? Do you mean to sit there and insult me? Do you think, sir, that I don't know my business? Why, I have been in the Hardware business for 35 years, and I know it from the ground up. I've brought this firm up to what it is today—brought it up from nothing, and you have the audacity to tell me I don't know what I'm doing. I can't believe, my boy, that you mean what you say. Go home and rest up for a week. You've been working too hard. Hard times are ——."

"No, Mr. Scott, I don't need a rest, and I don't mean to insult you. Let me explain. Advertising, like the law, dentistry or medicine, is a profession. Most business men will not admit this, but it is so. You wouldn't be insulted if I let you understand that I thought that you didn't know anything about dentistry, but you are because I as much as tell you that I know more about ad-

vertising than you do. It's only natural, when you take into consideration the fact that I have spent quite a few years in learning and striving to perfect myself in this particular profession. May I proceed, sir?"

"Yes, go ahead."

"Well, sir, in the first place, let me point out to you that a good business man is not always a good advertiser. It's strange, but true, nevertheless, that a man who can sell a customer goods personally, cannot, in nine cases out of ten, sell him the same goods through an advertisement. As soon as he sits down to write an ad, he thinks out how many high sounding words he can cram into it. His ad merely becomes so much blank space through which he can air his knowledge of the English language. If he would stop to think for a minute, he would soon see that he merely has to say in his advertisement what he would say to his customer's face. Merely good sound arguments and common sense, written in the plainest and shortest words that can be found to explain his meaning. By using the common words, he can be understood by all classes of people, whereas, if he uses the uncommon words, the masses don't understand him, and haven't got the time or the inclination to look up their meaning in the dictionary. This is

The Whole Basis of Good Advertising,

and more business men are coming to realize it every day. They find it pays them to employ a man who has been trained to write good copy, and the more they know about it the more they leave him alone. Why, sir, your office boy could do what I have been doing since I came here, and that's what has been bothering me all along. I felt as if I were getting money under false pretenses, but never had the courage to have the matter out with you before. Now things have got to such a state that something must be done, and if after what I have said to you you intend to keep me I will try to think up some plan to get more business."

"Well, Jones, you've certainly given me a good jolt, and I don't know just yet whether to thank you or fire you. You'll have to give me time to think over what you've said. In the meantime you can think up your plan. Come and see me to-morrow morning."

* * * * * * * * * *

"Good morning, Mr. Scott."

"Good morning, Jones; you're not losing any time; I haven't gone through my mail yet."

"I'm kind of anxious to know my fate. Have you thought over yesterday's conversation yet?"

"Yes. I slept on it, and I've decided to forgive you for hurting my pride. I guess maybe too much success gave me a bit of a swelled head, but I'm ready to listen to you. Sit down; I'll be through in a minute."

An Aggressive Plan.

"Now, what's the scheme?"

"Well, sir, I haven't got it completed yet, but I can give you the outline of it. In the first place, I've found out that most firms are not looking very hard for business. They've cut down their advertising and called in most of their salesmen. There's a certain amount of business being done, and the firm that goes after it good and strong is going to get it. I've written most of our travelers and found out—what you of course know—that its merely shortage of funds that's crippling the retailers. They cannot order goods because they cannot collect their accounts in time to meet their obligations. My plan is to go out after things strong. Double our advertising space and keep on all our selling force. If we do this and offer the merchants longer credit, we're bound to clean up everything in sight. We have the capital to enable us to do this, and although it may be a little hard at first we'll

Win in the Long Run

and get a lot of men on our books that we haven't been able to land so far. We can sell our goods at six months and this will bring us up to about August. The crops will be beginning to come East then and the farmers will be able to pay up their accounts. Then we'll get our money and hang onto the customers we get now, by showing them that we're square and ready to meet them more than half way when they're up against it. If you'll give me a free hand at the advertising I can work in conjunction with the travelers, and I'll stake my job on it that my way will pay."

"Well, Jones, there's a good deal of common sense in what you say, although I think I can improve on your ideas somewhat. Get your ads up and we'll give your scheme a trial. If we come out all right your salary will be $1500. If we don't, this town will be too hot for you."

* * * * * * * * * *

Jones heard to-day that on January 1 his increase would take effect.

Farwell, Ozmun, Kirk & Co.'s Fiftieth Anniversary.

"IT was certainly a very happy affair for us," is the report received of the fiftieth anniversary of Farwell, Ozmun, Kirk & Co., St. Paul, Minn. The occasion was observed on December 22 by a dinner at the Ryan Hotel, given by the house to its entire force. About 350 were present, although there were a few necessary absentees. Each guest received a souvenir button bearing the new trademark of the house, and the attractive *menu* contained many happy hits on members of the house and road organizations. R. A. Kirk, the honored head of the house, was the leading speaker and gave an interesting historical sketch. There were also addresses by other prominent men in the city and State.

Sash Operating Apparatus.

The Lord & Burnham Company, Irvington-on-Hudson, N. Y., is manufacturing a variety of apparatus for opening and closing hinged and pivoted sash, in which line it has had over 40 years' experience. During this time the apparatus has been constantly improved, and the number of different types increased, so that it is now fully prepared to furnish a device which will meet every condition in the operation of ventilating sash of modern power houses, factories, foundries, car barns, public buildings and manufacturing plants of all descriptions. The engineering, drafting, manufacturing and sales departments being brought together at Irvington-on-Hudson, facilitates the submitting of close estimates and accurate layouts and the making of prompt deliveries of the apparatus.

Superior Brazing Compound.

The increasing use of metals in combinations and the desire for smooth, strong joints between the metals of the same or different kinds, give prominence to the art of brazing. To secure the best results in such work it is necessary, not only to purify the brazing spelter by means of a flux, but also to render the melted spelter fluid enough to reach every part of the surfaces to be jointed. These qualities are claimed for the Superior Brazing Compound made under the Hotelling Brothers Company formula by the Standard Mfg. Company, 203 South Canal street, Chicago. This product, it is stated, is over 98 per cent. pure boron, and its use is not attended by the deposits of scale or enamel, effects of an objectionable nature commonly resulting from the use of unsuitable chemicals as a flux. The compound, according to directions, should be mixed with water into a thin paste, and is applied with a brush or by dipping the parts to be bronzed into the solution. The work is then heated up slowly, and when the melting point of the spelter is nearly approached a small amount of the drying composition is placed on the joint and the spelter is applied at once. When the work has cooled to a dull red it is cooled off with strong soap water, which destroys the black oxide but does not harden the steel.

Barney & Berry's Extension Roller Skates

Barney & Berry, Springfield, Mass., have just put on the market greatly improved styles of extension roller skates, as here illustrated, with both plain and ball bear-

ings. The chief advantage is the Nedla truss used in all the different styles and numbers necessary for the use of adults and children of both sexes. Another betterment is the form of rubber cushion which is free from compression when not in immediate use. The skates for men and boys have an extension of from 8½ in. to 11 in., and for women and girls from 8 to 10½ in., any of which fully extended, it is said, will sustain without injury the weight of a person of 160 lb. on one foot in the center at right angle with the length. The truss is best shown in Fig. 2, which illustrates the truss bars and locking plate, with strong lateral braces and cushion at rest, with a sectional view of the hollow steel rolls used in the cheaper skates. The moderate prices for skates with plain bearings make them profitable for the street skating trade, the ball bearings being more suited to rink use. The

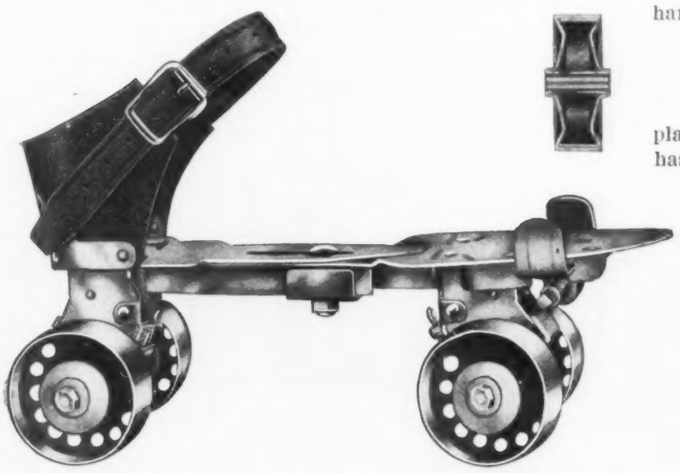


Fig. 1.—Ball Bearing Extension Roller Skate, with Sectional View of Klahn Wheel.

tops of all the skates are made of best cold rolled steel, and the other parts of open hearth steel, bright finish with grain leather straps. The lowest priced skate with plain bearings is fitted with hollow steel rolls, a section of which is shown in Fig. 2, or for a little more the Klahn roll, Fig. 1, may be had. The hollow steel rolls are fastened with cotter pins and Klahn rolls with hexagon nuts. The ball bearing skates are full nickel plated and buffed, and have in each bearing five ¼-in. steel balls in retainers. Men's skates have plain heel straps and for

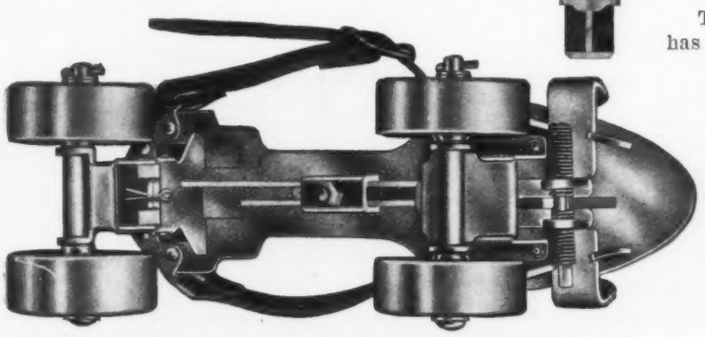
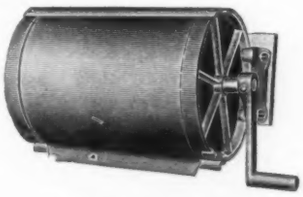


Fig. 2.—Showing Truss Bars, Locking Plate, Lateral Braces and Cushion.

women the regular strap seen in Fig. 1 is furnished. The plain bearing skates are wrapped in paper and the ball bearing styles are put up in double pasteboard boxes.

The Lily Clothes Line Reel.

The accompanying illustration shows a clothes line reel just brought out by the White Lily Mfg. Company, Davenport, Iowa. It is intended to be permanently fastened to the outside of a building or to a post where the clothes line is kept coiled up inside of the case always dry and ready for use. The device consists of a winding reel incased in a galvanized iron drum with protected cast iron spider heads. When the line is to be used the sliding cover is pushed back exposing the reel, and when the ratchet latch inside is raised the line can be unwound and carried to any point desired. When it is fastened the ratchet is dropped and a few turns of the handle will bring the line taut and hold it so. Any sagging occasioned by loading the line with clothes can be easily taken up in the same manner. The convenience of the reel is

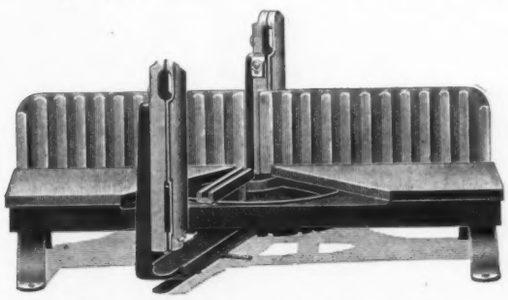


The Lily Clothes Line Reel.

compared with the ordinary way of stretching lines by hand.

The Greenfield Miter Box.

The Goodell Mfg. Company, Greenfield, Mass., has placed on the market the miter box shown herewith. It has a single piece iron bed and back, steel legs and

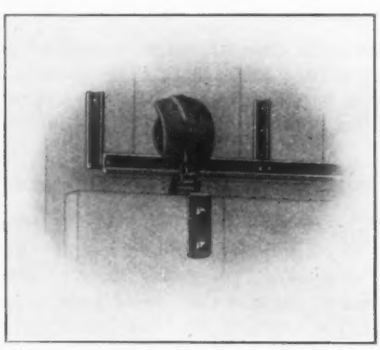


The Greenfield Miter Box.

emery boards to keep the work from slipping. The saw guides are quickly adjustable to any thickness of back or panel saw, and when using the former stops are provided to saw any depth. Rawhide in the gib prevents a panel saw striking metal. Provision is made for taking up any wear of the saw guides by adjustment of the screws on the inside of the posts. Besides automatically locking at all the regular angles by simply turning a lever, it can be instantly set and locked at any angle.

The Martin Flexible Barn Door Hanger.

The all steel frame barn door hanger, shown herewith, has a wide tread sheave wheel with a 13-16-in. hub re-



The Martin Flexible Barn Door Hanger.

volving on 10 antifriction rollers. The steel track is of the double channel variety, and the brackets supporting the track are self-splicing. The flexible connecting link allows the door to swing into the door jamb, so that it closes tight, the same as a hinged door. The vertical adjustment is such that by turning a burr the door can be adjusted to hang perfectly plumb. The covering of the hanger is galvanized; and the brackets to which the sections of track are fastened are arranged so as to make the joints as strong as any other part of the track. The point is made that the hanger combines the two advantages of adjustability and flexibility. It is offered by S. B. Martin, Dalton, Ohio.

Fuller All-Steel Stepladder.

H. B. Fuller, 186-188 West Third street, St. Paul, Minn., is marketing the all-steel stepladder which is shown herewith. The leading features of the ladder are extreme rigidity and strength combined with light weight, which is about the same as that of the best wood ladders of corresponding size. There is an entire absence of nails, screws, bolts or other fastenings likely to work loose, and the ladder is therefore not affected by heat, cold or dampness, and is designed to withstand hard usage. The sides of the ladder are made from one piece, the edges

Fuller All-Steel Stepladder.

being first doubled over and then bent at right angles, thus forming a double thick flange. Four longitudinal corrugations in the side pieces add materially to their stiffness. The steps are formed in the same manner, and are supported and riveted to angle pieces similarly secured to the sides. The back brace of the ladder is of sheet steel, being formed of light channel bars. Fitted over the top of each side of the ladder is a cap or box 2½ in. deep, which serves to connect the two parts of the ladder. To prevent marring finished floors the feet are shod with sole leather. The ladders are made in eight sizes, ranging from 3 to 12 ft., and are finished in dull enamel applied by the usual baking-on process.

Solid Steel Drop Forged Ice Pick.

The Elmore Tool Mfg. Company, Hartford, Conn., is introducing its solid drop forged ice pick, as shown herewith. The construction makes the tool practically indestructible and permits the use of even the steel edge of the handle for breaking ice. The head is large and heavy, which is regarded by the company as an important feature, and as the entire length of handle is drop forged

Solid Steel Drop Forged Ice Pick.

the end may be hammered without fear of injuring it. It is pointed out that there is no ring or screw at the small end of the handle. The edges of the handle are ribbed to overcome any shrinkage of the hard wood scales.

The Wagner Barn Door Stay Roller No. 103.

The pressed steel roller bracket here illustrated is designed as a stay to steady the movement of sliding barn doors, and is a late addition to the line of hardware specialties made by the Wagner Mfg. Company, Cedar Falls, Iowa. The bracket is stamped from solid

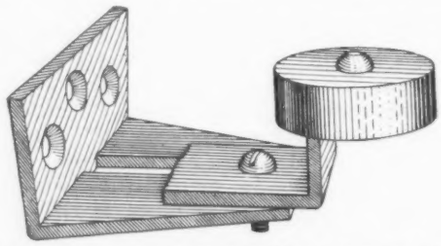


Fig. 1.—The Wagner Barn Door Stay Roller No. 103.

steel plate, and is reversible and adjustable to doors ½ in. to 2½ in. thick. Fig. 2 shows the bracket in reversed position. The plate to which the wheel is attached has a lip on the end which projects downward through the slot in the bracket plate and serves as a brace against lateral strain. Adjustment to doors of varying thickness is made by loosening the bolt and sliding the roller plate forward or backward to the required position, where it

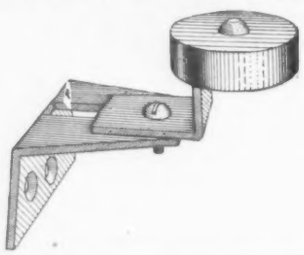
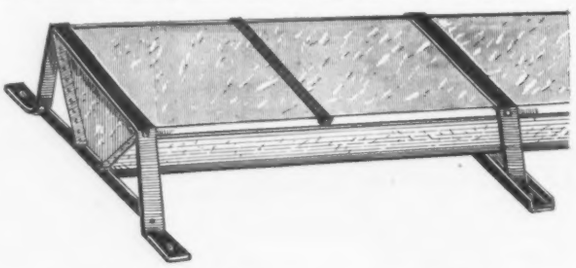


Fig. 2.—Wagner Stay Roller in Reversed Position.

is held by tightening the screw. The roller is a stamped steel wheel and the combination suggests strength, utility and convenience. The rollers are finished in black japan and are packed in wooden boxes of 1 doz. each weighing 10 lb.

The Drew Galvanized Steel Feed Trough.

The Drew Elevated Carrier Company, Waterloo, Wis., is manufacturing the feed trough, shown herewith. It



The Drew Galvanized Steel Feed Trough.

is referred to as being practically indestructible, yet light enough to be readily handled and cleaned. The trough is made of No. 20 gauge sheet steel, supported by heavy wrought steel legs. The legs may be screwed to the floor if desired, but if not screwed down the broad base renders the trough very stable. The bottom is cone shaped and the sides straight, enabling animals to readily clean up feed or slops, and rendering the trough easy to cleanse by washing or flushing. It is made in 2, 4, 6, 8 and 10 ft. lengths, and 10-ft. lengths and longer are reinforced with angle steel edges.

Steiner's Family Motor.

Two illustrations are herewith given showing the adaptability of a family motor to household uses. The motor is offered by American Stove & Queensware Company, 2605 North Fourteenth street, St. Louis, Mo. In addition to the uses indicated by the illustrations it can also be used for operating washing machines, gas man-

Fig. 1.—Steiner's Family Motor Connected to Ice Cream Freezer.

gles, clothes wringers, coffee mills, grating machines, sewing machines, grinding machines and polishing heads. These articles are provided with suitable attachments for use in connection with the motor, and can be operated by women. The motor, which is furnished for direct or alternating current, is supplied with 6 ft. of code cord, switch and plug ready to screw into any incandescent

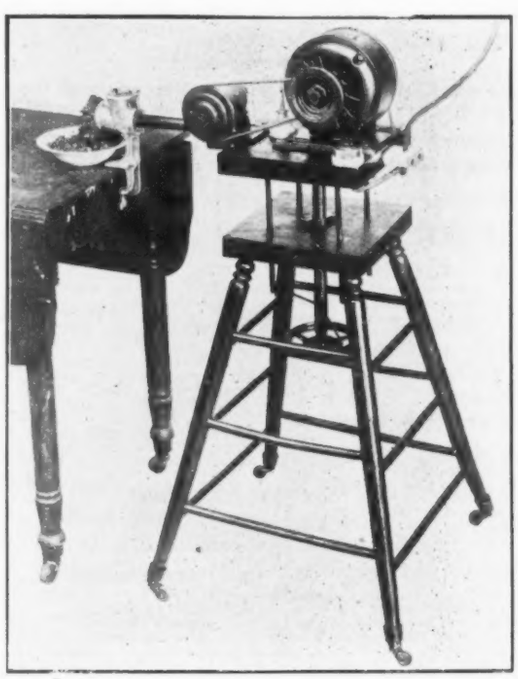
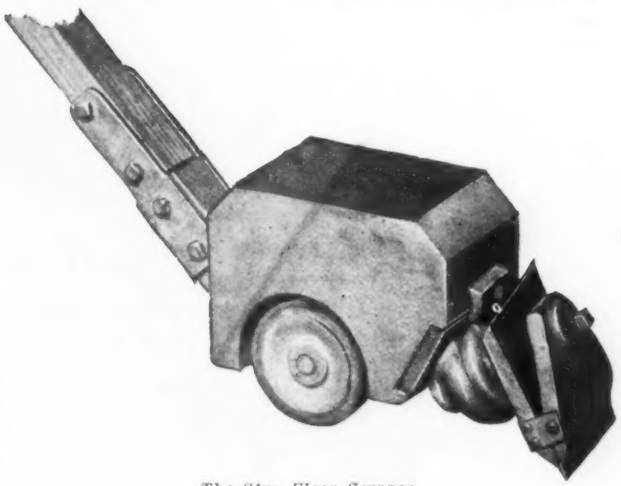


Fig. 2.—Steiner's Family Motor Operating Meat and Vegetable Cutter.

light socket. The motor is mounted upon an adjustable portable stand, occupying 20 x 20 in. floor space, substantially made of the best oak and finished with three coats of varnish. It moves easily on ball bearing casters, and there is a hand wheel under the stand for adjusting to desired hights. The motor is ⅛ hp., best full load start, and is entirely inclosed in outer casing, so as to obviate danger to the fingers of children or adults and to prevent receiving any shock, as all connections are insulated. In addition to the shaft is a cone pulley in steps of 2, 3 and 4 in., belted to a special gear of the same sized pulleys so as to afford three speeds. The gear, which is made of bronze metal and steel, is also inclosed. This gear increases the power of the motor 20 times. The statement is made that the motor will last for years, as the bearings are all made of the best steel and bronze; also that the motor will never get out of order, and that it needs little or no attention except an occasional oiling.

The Star Floor Scraper.

One of the features of the floor scraper shown in the accompanying illustration is, that by means of the ball and socket connection between the blade and carrying head the blade can be set diagonally across the flooring to any angle desired. Having a shearing cut it operates smoothly over butt joints and removes all the planer marks and any little irregularities so as to give a perfectly smooth finish. It works equally well on old or

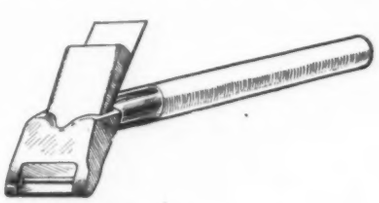


The Star Floor Scraper.

new floors, and always has enough weight on the wheels to guide it, so that there is no trouble experienced by it shearing to one side. In operating the scraper the manufacturer suggests that the cutting blade first be set diagonally across the floor to a right or left angle and then run quickly over the floor and level down. After the floor has been leveled down the angle of the cutting blade is reversed and the work finished. The scraper weighs 80 lb., and is claimed to be properly balanced to give the most satisfactory results in operation. It is put on the market by the Star Scraper Company, Elkhart, Ind.

The Hildreth Floor Scraper.

L. M. Hildreth, 514 Elm street, New Haven, Conn., has put on the market the floor scraper here shown, intended for use on hard or soft wood, by carpenters, builders and woodworkers generally. The construction is such that the bearings limit the depth of the cut, thus render-

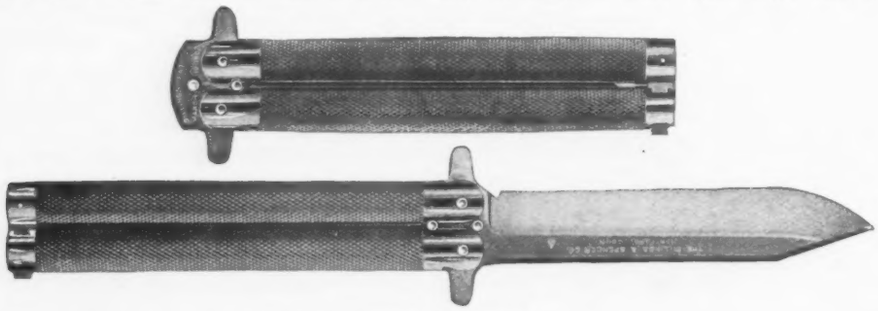


The Hildreth Floor Scraper.

ing it impossible to gouge into the work, while at the same time it allows the entire tool to be regulated to any angle without the use of loose joints or swivels. The claim is made that the scraper cuts like a plane and never chatters or jumps. It weighs 20 oz., and is packed each separately in a neat box.

Billings Improved Sportsman's Knife.

The accompanying illustrations show a patent knife for sportsmen's use, offered by the Billings & Spencer Company, Hartford, Conn. The knife is made of steel throughout, and the blade is drop forged of the best material. To open the knife the clasp at the end of the handle is released and the two sections of the handle are thrown back in opposite directions and caught again by the clamp in a reverse position, bringing the knife into place for use. The handle is knurled and is of sufficient length to insure a good grip. The knife is referred to as being carefully made and assembled throughout, nickel plated and nicely finished, and at the same time a strong, durable hunting knife.



Billings Improved Sportsman's Knife.

The K. & J. Pressed Boxes.

The accompanying illustrations represent pressed boxes recently put on the market by the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio. The feed box, Fig. 1, is made of heavy steel, galvanized, and has a rolled edge. The back is left open, so that a board may be inserted and the box fastened to the wall. The box is adapted to the use of express companies and livery stables. The stacking box, Fig. 2, is made longer at the bottom than at the top, for stacking purposes. The top lateral edges are turned over a heavy continuous rod, the extensions of which form handles. Boxes of this type may be piled in tiers when level full, requiring comparatively little space and avoiding the use of racks. The box is made to any size or from steel of any thickness. The tapering shape of the box illustrated in Fig. 3 permits a number of them to be closely nested and stored in a small space. It is made practically to order, like the stacking box.

Fig. 1.—Feed Box.

Fig. 2.—Stacking Box.

Fig. 3.—Taper Box.

The stock of Hardware of John Frederick of Weyauwega, Wis., has been purchased by W. E. Davids, who will continue the business, carrying a full line of Shelf and Heavy Hardware.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—

	℔ gal. bbls.
Linseed, Western, Raw	49 @50
State, Raw	49 @50
City, Raw	50 @51
Boiled, 1¢ ℔ gal. advance on Raw.	
Raw, Calcutta, in bbls	70 @..
Lard, Prime, Winter	73 @76
Extra No. 1	51 @52
No. 1	46 @48
Cotton-seed, Crude, f.o.b. mill	31 @32
Summer, Yellow, prime	39¾@10¼
Summer, White	42 @43
Yellow Winter	46 @46½
Tallow, Acidless	58 @59
Menhaden, Brown, Strained	34 @35
Northern Crude	@..
Southern	24½@25
Light Strained	34 @35
Bleached Winter	36 @38
Ex. Bleached Winter	38 @39
Cocoanut, Ceylon	℔ lb 6¾@ 7
Cochin	℔ lb 7¼@ 7½
Cod, Domestic, Prime	38 @40
Newfoundland	40 @42
Red Elaine	41 @43
Saponified	℔ lb 6½@ 6¾
Olive, Yellow	$1.15@$1.35
Neatsfoot, Prime	55 @58
Palm, Lagos	℔ lb 6 @ 6¼

Mineral Oils—

	℔ gal.
Black, 29 gravity, 25@30 cold test	13 @13½
29 gravity, 15 cold test	13½@14
Summer	12½@13
Cylinder, light filtered	20½@21
Dark, filtered	18 @19
Paraffine, 903-907 sp. gravity	14½@15
903 sp. gravity	13½@14
983 sp. gravity	11 @11½
Red	13¼@14

Miscellaneous—

Barytes:	
White, Foreign	℔ ton $18.50@20.50
Amer., floated	℔ ton 17.00@18.00
Off color	℔ ton 12.50@15.00
Chalk, in bulk	℔ ton 3.00@ 3.40
China Clay, Imported	℔ ton 11.50@18.00
Cobalt, Oxide	℔ 100 lb 1.45@ 2.60
Whiting, Commercial	℔ 100 lb 42@52
Gilders	℔ 100 lb .55@ .60
Ex. Gilders	℔ 100 lb .60@ .65

Putty, Commercial—℔ 100 lb

In bladders	$1.70 @1.80
In bbls. or tubs	1.20 @1.45
In 1 lb to 5 lb cans	2.65 @2.95
In 12½ to 50 lb cans	1.50 @1.90

Spirits Turpentine—℔ gal.

In Oil bbls	41 @41½
In machine bbls	41½@42

Glue—

	℔ lb
Cabinet	12 @15
Common Bone	7½@ 9
Extra White	18 @24
Fish, liquid, 50 gal. bbls., per gallon	60 @1.20
Foot Stock, White	12 @14
Foot Stock, Brown	9 @11
German Common Hide	10 @12
German Hide	12 @18
French	10 @40
Irish	13 @16
Low Grade	10 @12
Medium White	14 @17

Gum Shellac—

	℔ lb
Bleached, Commercial	20 @21
Bone Dry	25 @26
Button	30 @40
Diamond I	@39
Fine, Orange	30 @35
A. C. Garnet	21 @22
Kala Button	15½@16
D. C	@41
Octagon B	31 @32
T. N	20½@21
V. S. O	@35

Colors in Oil—

	℔ lb
Black, Lampblack	12 @14
Blue, Chinese	36 @46
Blue, Prussian	32 @36
Blue, Ultramarine	13 @16
Brown, Vandyke	11 @14
Green, Chrome	12 @16
Green, Paris	@24
Sienna, Raw	12 @15
Sienna, Burnt	12 @15
Umber, Raw	11 @14
Umber, Burnt	11 @14

White and Red, Lead &c.—

	℔ lb
Lead, English white, in Oil	10⅛@10⅝
Lead, American White:	
Dry and in Oil, 100, 250 and 500 lb kegs	6¾
Dry and in Oil, 25 and 50 lb kegs	7
Dry and in Oil, 12½ lb kegs	7¼
In Oil, 25 lb tin pails	7¼
In Oil, 12½ lb tin pails	7¾
In Oil, 1, 2, 3 and 5 lb tin cans, ass't	8¾
Red Lead and Litharge:	
In 100 lb kegs	7
In 25 and 50 lb kegs	7¼
In 12½ lb kegs	7½
In lots of less than 500 lbs, ½c ℔ lb advance over above prices of White and Red Lead and Litharge.	
Lead, American. Terms: On lots of 500 lbs and over, 60 days, or 2% for cash if paid in 15 days from date of invoice.	

Zinc, Dry—

	℔ lb
American, dry	5¼@ 5⅝
Red Seal (French process)	6¾@ 7
Green Seal	7¼@ 7½
German Red Seal (French process)	7 @7¼
Green Seal	7½@ 7⅞
White Seal	8¼@ 9
French, Red Seal	8⅝@ 8¾
Green Seal	10⅝@10⅝

Dry Colors—

	℔ lb
Black, Carbon	6¼@10
Black Drop, American	3½@ 8
Black Drop, English	5 @15
Black, Ivory	16 @20
Lamp, commercial	4 @ 6
Blue, Celestial	4 @ 6
Blue, Chinese	30 @32
Blue, Prussian	28 @30
Blue, Ultramarine	3½@15
Brown, Spanish	½@ 1
Carmine, No. 40	$3 10@3 25
Green, Chrome, ordinary	3½@ 5
Green, Chrome, pure	17 @25
Ocher, American	℔ ton $8.50@16.00
American Golden	2½@ 3¼
French	1¾@ 2
Foreign Golden	3 @ 4
Orange Mineral, English	10 @12
French	12¾@13
German	12 @13
American	9 @10
Red, Indian, English	4½@ 6
American	3 @ 3¼
Red, Turkey, English	4 @10
Red, Tuscan, English	7 @10
Red, Venetian, Amer.	℔ 100 lb $0.50@1.25
English	℔ 100 lb $1.15@1.60
Sienna, Italian, Burnt and Powdered	3 @ 9
Italian, Raw, Powdered	3 @ 7
American, Raw	1½@ 2
American Burnt and Pow'd	1½@ 2
Talc, French	℔ ton $18.00@25.00
American	℔ ton 15.00@25.00
Terra Alba, French	℔ 100 lb ,90@ 1.00
English	℔ 100 lb ,80@ 1.00
American	℔ 100 lb, No. 1. .75@ .80
American	℔ 100 lb, No. 2. .60@ .65
Umber, T'key, Bnt. & Pow.	2¾@ 3
Turkey, Raw and Powdered	2¾@ 3
Burnt, American	1½@ 2
Raw, American	1½@ 2
Yellow, Chrome, Pure	12¾@15
Vermilion, American Lead	7 @25
Quicksilver, bulk	65 @..
Quicksilver, bags	@66
English, Imported	@70
Chinese	$0.90@1.00

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓ @ 33⅓ & 10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued annually, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—"The Iron Age Standard Hardware Lists" contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—
Columbian and Domestic.....33⅓%
North's 10%
Upson's Patent, ₱ gro., $29.90.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—
Ives' Patent.....10%
Ives' Stop Bead Screws and Washers 10%
Taplin's Perfection.....10%

Ammunition—See *Caps, Cartridges, Shells, &c.*

Anti—Rattlers—
Fernald Mfg. Co. Burton Anti-Rattlers, ₱ doz. pairs, Nos. 1, $0.75; 2, $0.60; 4, $1.00; 5, $0.50.
Fernald Quick Shifter, ₱ doz. pairs .....$2.00@$3.00

Anvils—American—
Eagle Anvils.....₱ lb @8 ¢
Hay-Budden, Wrought.....9½@9¾¢
Trenton .....₱ lb 9½@9¾¢

Imported—
Swedish Solid Steel Paragon, ₱ lb .....10@10½¢
Swedish Solid Steel Sisco, Superior, ₱ lb.....10@10½¢
Peter Wright & Sons, ₱ lb, 84 to 349 lb, 11¢; 350 to 600 lb, 11½¢.

Anvil, Vice and Drill—
Millers Falls Co., $18.00.....15&10%

Apple Parers—See *Parers, Apple, &c.*

Aprons, Blacksmiths'—
Livingston Nail Co.....10%

Augers and Bits—
Com. Double Spur....80@80&10%
Jennings' Patn., Bright.65&10@70%
Black Lip or Blued...65@65&65%
Boring Mach. Augers.....70%
Car Bits, 12-in. twist.....40&10%
Ford's Auger and Car Bits.....40&5%
Ft. Washington Auger Co., Conard's 35%
Forstner Pat. Auger Bits.....25%
C. E. Jennings & Co.:
No. 10 ext. lip. R. Jennings' list, 25&7½%
No. 30, R. Jennings' list.....50%
Russell Jennings'.....25&10&2½%
L'Hommedieu Car Bits.....15%
Mayhew's Countersink Bits.....45%
Pugh's Black.....20%
Pugh's Jennings' Pattern.....35%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....60%
Snell's Car Bits, 12-in. twist.....60%
Snell's King Auger Bits.....50%
Swan's .....65&10@70
Swan's, Jennings' Pattern.....50%
Wright's Jennings' Bits.....50%

Bit Stock Drills—See *Drills, Twist.*

Expansive Bits—
Clark's Pattern, No. 1, ₱ doz., $26; No. 2, $18.....60&10%
Ford's, Clark's Pattern...60&5@60&10%
C. E. Jennings & Co., Steer's Pat..25%
Lavigne Pat., small size, $18.00; large size, $26.00.....60&10%
Swan's 60%

Gimlet Bits—
Per gro.
Common Dbl. Cut.....$3.00@3.25
German Pattern, Nos. 1 to 10, $4.75; 11 to 13, $5.75

Hollow Augers—
Bonney Pat., per doz..$5.50@6.00
Ames .....20&10%
Universal 20%

Ship Augers and Bits—
Ship Augers.....40&10@—%
Ford's .....33⅓&5%
C. E. Jennings & Co.:
L'Hommedieu's 6%
Watrous' .....33⅓&7½%
Snell's 40%

Awl Hafts—See *Handles, Mechanics' Tool.*

Awls—
Brad Awls:
Handled .....gro. $2.75@3.00
Unhdld, Shldered...gro.63@66¢
Unhandled, Patent..gro.66@70¢
Peg Awls:
Unhandled, Patent..gro. 31@34¢
Unhdld, Shldered..gro. 65@70¢
Scratch Awls:
Handled, Com...gro. $3.50@4.00
Handled, Rocket..gro.$11.50@12.00
Elmore Tool Mfg. Co.:
Tinners' and Brad Awls.....55&7%
Scratch Awls.....60%

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—
Single Bit, base weights: Per doz.
First Quality.....$4.75@5.00
Second Quality.....$4.25@4.50
Double Bit, base weights:
First Quality.....$7.00@7.50
Second Quality.....$6.50@6.75

Axle Grease—See *Grease, Axle.*

Axles—*Iron or Steel.*
Concord, Loose Collar...4¼@4½¢
Concord, Solid Collar....4½@5 ¢
No. 1 Common, Loose...3½@4 ¢
No. 1½ Com., New Style.4¼@4¾¢
No. 2 Solid Collar.....4¼@4¾¢
Half Patent:
Nos. 7, 8, 11 and 12.....70%
Nos. 13 to 14.....70%
Nos. 15 to 18...70&10@70&10&5%
Nos. 19 to 22...70&10@70&10&5%

Boxes, Axles—
Common and Concord, not turned .....lb., 5@6¢
Common and Concord, turned, lb., 6@7¢
Half Patent.....lb., 9½@10¢

Bait—Fishing—
Hendryx:
A Bait.....20%
B Bait.....25%
Competitor Bait.....20&5%

Balances—Sash—
Caldwell new list.....50&10%
Pullman .....50&10%

Spring—
Light Spring Balances.60@60&5%
Chatillon's:
Light Spg. Balances.....50@50&10%
Straight Balances.....40@40&10%
Circular Balances.....50&10%
Large Dial.....30%

Barb Wire—See *Wire, Barb.*

Bars—Crow—
Steel Crowbars, 10 to 40 lb. ... per lb., 2¼@2½¢

Towel—
No. 10 Ideal, Nickel Plate..₱ gro. $8.50

Beam, Scale—
Scale Beams.....40%
Chattillon's No. 1.....30%
Chatillon's No. 2.....40%

Beaters, Carpet—
Holt-Lyon Co.:
No. 12 Wire Coppered ₱ doz. $0.80; Tinned $0.85
No. 11 Wire Coppered ₱ doz. $1.15; Tinned $1.20
No. 10 Wire Tinned.....₱ doz. $1.50

Beaters Egg—
Dover Stamping & Mfg. Co.:
Genuine Dover, per gro., No. 1, Tumbler Size, $7.50; No. 2, Family Size, $7.50; No. 3, Extra Family Size, $24.00; No. 4, Hotel Size, $30.00.
Holt-Lyon Co.:
Holt, per doz., No. 5, Jap'd $0.80; No. A, Jap'd, $1.15; No. B, Jap'd, $1.85; No. 6, Jap'd, $1.65.
Lyon, Jap'd, per doz., No. 2, $1.35.
Taplin Mfg. Co.:
Improved Dover, per gro., No. 60, $6.00; No. 75, $6.50; No. 100, $7.00; No. 102, Tin'd, $8.50; No. 150, Hotel, $15.00; No. 152, Hotel Tin'd, $17.00; No. 200, Tumbler, $8.50; No. 202, Tumbler Tin'd, $9.50; No. 300, Mammoth, per doz., $25.00.

Bellows—
Blacksmith, Standard List:
Split Leather.....60&10@65%
Grain Leather.....50@50&10%

Hand—
Inch.. 6 7 8 9 10
Doz..$5.00 5.50 6.00 6.50 7.50

Molders—
Inch.. 10 12 14 16
Doz..$7.50 9.00 12.00 15.00

Bells—Cow—
Wrought Cow Bells.....75%
Jersey .....75&10%
Texas Star.....50%

Door—
Home, R. & E. Mfg. Co.'s.....55&10%

Hand—
Polished, Brass.....60@60&10%
White Metal.....60@60&10%
Nickel Plated.....50&10%
Swiss .....50&10%
Cone's Globe Hand Bells.....35@35%

Miscellaneous—
Farm Bells.....lb., 2¼@2½¢
Church and School....60@60&10%

Belting—Leather—
First Quality, Ex. Hy., Strictly Short Lap.....60&10%
Standard .....70&10@70&10&5%
Light Double.....75&10%
Cut Leather Lacing.....45@50%
Leather Lacing Sides, per sq. ft.25¢

Rubber—
Competition (Low Grade), 70&10@75%
Standard .....60&10@70%
Best Grades.....40@50%

Bench Stops—See *Stops, Bench*

Benders and Upsetters, Tire—
Green River Tire Benders and Upsetters 20%

Bicycle Goods—
John S. Leng's Son & Co.'s 1908 list:
Chain, Parts, Spokes.....50%
Tubes 60%

Bits—
Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Blocks Tackle—
Common Wooden.....75@75&5%
B. & L. B. Co.:
Boston Wood Snatch, 50%; Eclipse Steel, 75%; Hollow Steel, 50&10%; Star Wire Rope, 50%; Tarbox Metal Snatch, 50%; Tarbox New Style Steel, 50&10%; Wire Rope Snatch, 50%.
Lane's Patent Automatic Lock and Junior 30%
See also Machines, Hoisting.

Boards, Stove—
Paper and Wood Lined.....55%
Embossed 55%

Boards, Wash—
See *Washboards.*

Bobs, Plumb—
Keuffel & Esser Co.....33⅓&10%

Bolts Carriage, Machine, &c.—
Common Carriage (cut thread): ⅝ x 6 and smaller.....75&5%
Larger and longer.....70&5%
Common Carriage (rolled thread): ⅝ x 6, smaller and shorter, 75&10&5%
Phila. Eagle, $3.00 list...80&—%
Bolt Ends, with C. & T. Nuts, 70&10%
Machine (Cut Thread): ⅜ x 4 and smaller.....75&10%
Larger and longer.....70&10%

Door and Shutter—
Cast Iron Barrel, Japanned, Round Brass Knobs:
Inch ... 3 4 5 6 8
Per doz..$0.30 .35 .45 .60 .80
Cast Iron Spring Foot, Jap'd:
Inch 6 8 10
Per doz.....$1.20 1.50 2.25
Cast Iron Chain, Flat, Japanned:
Inch 6 8 10
Per doz.....$1.00 1.40 1.65
Cast Iron Flat Shutter, Jap'd, Brass Knobs:
Inch 6 8 10
Per doz.....$0.75 .95 1.25
Wrought Barrel Japanned, 80&10@80&10&5%
Barrel Bronzed.....60&10%
Spring .....70&10@70&10&10%
Shutter .....50&5@50&10&5%
Square Neck.....75@75&10%
Square .....70&10&10@80%
Ives' Mortise.....10%
Ives' Wrought Metal.....10%

Expansion—
F. H. Evans' Crescent.....40@60%
Richards Mfg. Co.....55&10%
Star Expansion Bolt Co.:
Star, Lag Screw Type..60&10&5&2½%
Star, Wood Screw Type.....40%
Star, Machine, Single Wedge....60%
Star, Machine, Double Wedge....60%
Steward & Roman Mfg. Co.:
Style No. 13, Double.....60%
Style No. 1, Single.....60%
Style No. 100, Dbl. Jaw, Single..55%
Lag Screw.....66⅔%

Plow and Stove—
Plow .....65&5@70%
Stove .....85@85&5%

Tire—
Common Iron.....80%
Norway Iron.....80%
American Screw Co.:
Norway Phila., list Oct. 16, '84 . 80%
Eagle Phila., list Oct. 16, '84 82½%
Bay State, list Dec. 28, '99.....80%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '84...80%
Eagle Phila., list Oct. 16, '84...82½%
Eclipse, list Dec. 28, '99.....80%
Russell, Burdsall & Ward Bolt & Nut Co.:
Empire, list Dec. 28, '99.....80%
Norway Phila., list Oct. '84.....80%
Eagle 82½%
Shelton Co.:
Tiger Brand, list Dec. 28, '99....80%
Phila., Eagle, list Oct. 16, 1884..82½%
Upson Nut Co.:
Tire Bolts.....72½%

Borers, Bung—
Borers Bung, Ring, with Handle:
Inch..... 1¼ 1½ 1¾ 2
Per doz...$4.80 5.60 6.40 8.00
Inch..... 2¼ 2½
Per doz.....$8.65 11.50
Enterprise Mfg. Co., No. 1, $1.25; No. 2, $1.75; No. 3, $2.50 each.....25%

Boxes, Mitre—
C. E. Jennings & Co.....25%
Langdon, New Langdon and Langdon Improved, 20&10%; Langdon Acme .....15&10%
Perfection 40%
Seavey 15%

Braces—
Common Ball, American....$1.50
Barber's .....50&10&10@60&10%
Fray's Genuine Spofford's.....60%
Fray's No. 61, 166, 206, 614.....50%
C. E. Jennings & Co.....50&5%
Mayhew's Ratchet.....60%
Mayhew's Quick Action Hay Pat...50%
Millers Falls Drill Braces.....25&10%
P., S. & W. Co., Peck's Pat....60&10%

Brackets—
Wrought Steel.....75&10&5@80%
Bradley Metal Clasp...80&10@80&10&5%
Griffin's Pressed Steel.....75@75&10%
Griffin's Folding Brackets.....70&10%
Taplin Victor Handy Egg Beater Bracket .....₱ doz. $1.50

Bright Wire Goods—See *Wire and Wire Goods.*

Broilers—
Kilbourne Mfg. Co.....75&20%
Wire Goods Co.....75%

Buckets, Galvanized—
M'fr's list, price per gross.
Quart.. 10 12 14
Water, Reg...26.85 29.50 33.50
Water, Hvy...45.35 48.00 52.00
Fire, Rd. Btm.32.00 34.65 38.65
Well 37.35 41.35 45.35
Add 7½&5@5%

Bull Rings—See *Rings, Bull.*

Butts—Brass—
Wrought, High List, Oct..6.'06.65%
Cast Brass, Tiebout's.....40&10%

Cast Iron—
Fast Joint, Broad....40&10@50%
Fast Joint, Narrow...40&10@50%
Loose Joint.....70&10@75%
Loose Pin.....70&10@75%
Mayer's Hinges.....70@70&5
Parliament Butts.....70@70&5

Wrought Steel—Bright.
Light Narrow, Light Reversible .....70&5%
Reversible and Broad..70&5%
Loose Joint, Narrow, Light Inside Blind, &c.....70%
Back Flaps, Table Chest.65%
Japanned.
Light Narrow, Loose Pin, 40&5%
Light Narrow, Ball Tip..60%
Broad .....40&5%
Steeple Tipped.....70%
Ball Tipped.... .....70%
Extra, 10@—

Cages, Bird—

Hendryx Brass: Series 3000, 5000, 1100, net list; 1200, 15%; 200, 300, 900 ..... 30%
Hendryx Bronze: Series 700, 800.... 30%
Hendryx Enameled..... 35%

Calipers—See *Compasses.*

Calks, Toe and Heel—

Blunt, 1 prong, per 100 lb., $3.50@$3.85
Sharp, 1 prong, per 100 lb., $4.00@$4.35
Burke's, 1 pg. Blunt Toe, 3¾¢; 2 pg. Blunt Toe, 4¼¢; 1 pg. Sharp Toe, 4¼¢; 2 pg. Sharp, 4¾¢; Blunt Heel, 4½¢; Sharp Heel..... 4¾¢
Lautier, Blunt, 4@4¼¢; Sharp, 4½@4¾¢
Perkins', Blunt, ₱ lb, 3.65¢; Sharp, 4.15¢

Can Openers—

See *Openers, Can.*

Caps, Percussion—

Eley's E. B..... 52@55¢
G. D..... per M 35@45¢
F. L..... per M 40@48¢
G. E..... per M. 48@50¢
Musket ..... per M 62@63¢

Primers—

Berdan Primers, $2 per M.. 20&5%
Primer Shells and Bullets.. 15&10%
All other primers per M. $1.52@1.60

Carpet Stretchers—

See *Stretchers, Carpet.*

Cartridges—

Blank Cartridges:
32 C. F., $5.50..... 10&5%
38 C. F., $7.00..... 10&5%
22 cal. Rim, $1.50..... 10&5%
32 cal. Rim, $2.75..... 10&5%
B. B. Caps, Con. Ball, Swgd. $190
B. B. Caps, Round Ball.... $1.40
Central Fire..... 25%
Target and Sporting Rifle. 15&5%
Primed Shells and Bullets. 15&10%
Rim Fire, Sporting..... 50%
Rim Fire, Military..... 15&5%

Casters—

Bed ..... 65&10@70%
Plate ..... 60@60&5%
Philadelphia ..... 70&10@75%
Acme, Ball Bearing..... 35%
Gem (Roller Bearing).... 70&10&5%
Steel Gem (Roller Bearing)..... 70%
Standard Ball Bearing..... 45%
Yale (Double Wheel) low list... 40&10%

Cattle Leaders—

See *Leaders, Cattle.*

Chain, Proof Coil—

American Coil, Straight Link:

3-16	¼	5-16	⅜	½	⅝
$7.70	5.10	4.15	3.50	3.30	3.10

¾-⅞-1 1⅛ to 1¼ inch.
$3.00 3.10
In cask lots, deduct 25¢.
German Coil..... 70%
German Pattern Coil:
6-0 to 1..... 70&10&5%
2 and 3..... 60&10&10@70%
4, 5 and 6..... 50&10@50&10&5%

Halter—

Halter Chains..... 60&5@60&10%
German Pattern Halter Chains, list July 24, '97.... 60&10&5@70%
Covert Mfg. Co.:
Halter ..... 35&5%

Cow Ties—

See *Halters and Ties.*

Trace, Wagon, &c.—

Traces, Western Standard: 100 pr. 6½—6-3, Straight, with ring. $26.00
6½—6-2, Straight, with ring. $27.00
6½—8-2, Straight, with ring. $30.00
6½—10-2, Str'ght, with ring. $35.00
NOTE.—Add 2c per pair for Hooks Twist Traces: add per pair for Nos. 2 and 3, 2c; No. 1, 3c; No. 0, 4c to price of Straight Link.
Eastern Standard Traces, Wagon Chain, &c..... 70%

Miscellaneous—

Jack Chain, list July 10, '93: Iron ..... 60&10&5@60&10&10%
Brass 65%
Safety and Plumbers' Chain. 75%
Gal. Pump Chain....lb., 4½@5%
Bridgeport Chain Co.:
Triumph Halter and Coil. 35&2½@40%
Triumph Dog..... 50&10@60%
Brown Halter and Coil.... 45@50&5%
Covert Mfg. Co.:
Breast, Halter, Heel, Rein, Stallion 40%
Oneida Community:
American Halter, Dog and Kennel Chains ..... 35&2½@40%
Niagara Dog Leads and Kennel Chains ..... 45@50&5%
Wire Goods Co.:
Dog Chain..... 70%
Universal Dbl.-Jointed Chain.... 70%

Chain and Ribbon, Sash—

Oneida Community:
Steel Chain..... 60%
Pullman:
Bronze Chain, 60%; Steel Chain, Coppered ..... 60&10%
Sash Chain Attachments, per set.. 8¢
Aluminoy Sash Ribbon, per 100 ft. ..... $2.00@$5.00
Sash Ribbon Attachments, per set.. 8¢

Chalk—

Carpenters' Blue..... gro., 50¢
Carpenters' Red..... gro., 50¢
Carpenters' White..... gro., 40¢

Checks, Door—

Bardsley's 45%
Pullman, per gro..... $54.00
Russwin 33⅓%

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools..... 55%
Youths' Chests, with Tools..... 40%
Gentlemen's Chests, with Tools.. 30%
Farmers', Carpenters, etc., Chests, with Tools 20%
Machinists' and Pipe Fitters' Chests, Empty..... 45%
Tool Cabinets..... 45%
C. E. Jennings & Co.'s Machinists' Tool Chests..... 1/2%

Chisels—Socket Framing and Firmer

Standard List..80&10@80&10&10%
Buck Bros..... 30%
C. E. Jennings & Co.:
Socket Firmer No. 10..... 25&7½%
Socket Framing No. 15..... 25&7½%
Swan's ..... 66⅔&70%
L. & I. J. White & Co..... 30@30&5%

Tanged—

Tanged Firmers..... 30&5@35%
Buck Bros..... 30%
C. E. Jennings & Co. Nos. 191, 181.. 25%
L. & I. J. White Co..... 25&5%

Cold—lb.

Cold Chisels, good quality. 13@15¢
Cold Chisels, fair quality. 11@12¢
Cold Chisels, ordinary.... 9@10¢
Elmore Tool Mfg. Co.:
Cold Chisels..... 50&5%

Chucks—

Almond Drill Chucks..... 35%
Almond Turret Six-Tool Chuck.... 40%
Beach Pat, each $8.00..... 35&5%
Empire 25%
Blacksmiths' 25%
Jacobs' Drill Chucks..... 35%
Pratt's Positive Drive..... 25%
Skinner Lathe Chucks:
Independent 35%
Universal, Reversible Jaws..... 35%
Universal, Com. Style Jaws..... 40%
Combination, Reversible Jaws.... 35%
Combination, Com. Style Jaws... 40%
Round Body or Box Body, 2 Chuck Jaws 25%
Geared Scroll Chucks..... 25%
Drill Chucks:
New Model, 25%; Geared Pattern, 25%; Skinner Patent, ... 25%
Positive Drive..... 40%
Planer Chucks..... 20%
Standard 45%
Drill Press Vises..... 30%
Face Plate Jaws..... 35%
Standard Tool Co.:
Improved Drill Chuck..... 45%
Union Mfg. Co.:
Combination, Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 17, 40%; No. 21..... 35%
Scroll Combinations, Nos. 83 and 84 ..... 30%
Geared Scroll, Nos. 33, 34 and 35.. 25%
Independent Iron, Nos. 18 and 318. 35%
Independent Steel, No. 64..... 25%
Union Drill, Nos. 000, 00, 100, 101, 102, 103, 104..... 35%
Union Czar Drill..... 25%
Universal, 11, 12, 16, 17, 13, 14, 15.. 40%
Universal No. 42..... 35%
Iron Face Plate Jaws, Nos. 28, 30, 48 and 50..... 35%
Steel Face Plate Jaws, Nos. 70 and 72 ..... 30%
Westcott Patent Chucks:
Lathe Chucks..... 50%
Little Giant Auxiliary Drill..... 50%
Little Giant Double Grip Drill.... 50%
Little Giant Drill, Improved..... 50%
Oneida Drill..... 50%
Scroll Combination Lathe..... 50%
Whitaker Mfg. Co.:
National Drill..... 25%

Clamps—

Carriage Makers', Star, P., S. & W. Co. 50%
Besly, Parallel..... 33⅓&10%
Hammer & Co.:
Adjustable ..... 20&5%
Carriage Makers' H. P. Screw. 40&5%
Myers' Hay Rack..... 50%
Lineman's Swedish Neverturn..... 65%
Saw Clamps, see Vises, Saw Filers'

Cleaners, Drain,

Iwan's Champion, Adjustable..... 50%
Iwan's Champion, Stationary..... 40%

Sidewalk—

American Fork & Hoe Co.:
Star, ₱ doz., Socket, $4.00; Shank $3.50
Shank, ₱ doz., X 7½, $3.50; Shank, X 8..... $3.75

Cleavers, Butchers'—

Foster Bros..... 30%
Fayette R. Plumb..... 30%
L. & I. J. White Co..... 30%

Clippers, Horse and Sheep—

Chicago Flexible Shaft Co.: (20%)
1902 Chicago Horse, each..$10.75
20th Century Horse, each...$5.00
Lightning Belt Horse, each,$15.00
Chicago Belt Horse, each..$20.00
Stewart's Enclosed Gear Roll Bearing Horse, each.....$6.75
Stewart's New Model Sheep Shearing Machine, each..$12.75
Stewart Enclosed Gear Shearing Machine, No. 8, each..$9.75

Clips, Axle—

Regular Styles, list July 1, '05, 80&80&10%

Cloth and Netting, wire—See *Wire, &c.*

Cocks, Brass—

Hardware list:
Plain Bibbs, Globe, Kerosene, Racking, Liquor, Bottling, &c 75%
Compression Bibbs..... 70%

Coffee Mills—

See *Mills, Coffee.*

Collars, Dog—

Nickel Chain, Walter B. Stevens & Son's list..... 40%
Leather, Walter B. Stevens & Son's list 40%

Compasses, Dividers, &c.

Ordinary Goods..... 70&10@75%

Conductor Pipe,—

L. C. L. to Dealers:

	Gal. Steel.	Charcoal. Copper.
Northeastern:		
70&10%	50&10&7½%	50&10%
Eastern:		
70&10&5%	50&10&7½%	50&10%
Central:		
75&5%	60%	50&10%
Northwestern:		
75&5&2½%	60%	50&10%
Western:		
70&7½%	50&12½%	50&5%
Tennessee:		
70&10%	50&12½%	50&10%
Southern:		
70%	50&12½%	50&5%
Southwestern:		
70%	50&5%	50&5%

Terms, 60 days: 2% cash 10 days. Factory shipments generally delivered.
See also Eave Troughs.

Coolers, Water—

L. & G. Mfg. Co.:

Gal.	2	3	4	6	8
Galvanized, ea.	$1.85	$2.00	$2.25	$2.90	$3,90

Galvanized, Lined, side handles,

Gal.	2	3	4	6	8
Each	$1.95	$2,15	$2.40	$3.30	$4,15

White Enameled..... 10%
Agate Lined..... 10%

Coppers' Tools—

See *Tools, Coopers'.*

Coppers, Soldering—

Soldering Coppers, 3 lb. to pair and heavier, 21½¢; lighter than 3 lb. to pair..... 23½¢

Cord—Sash—

Braided, Drab..... lb. 35¢
Braided, White, Com., Nos. 8 to 12, 22¢; No. 7, 22½¢; No. 6, 23½¢. In lots of 12 doz. or over, 1 cent less per pound.
Cable Laid Italian, lb., No. 18. 37¢
Italian, lb., A, No. 18, 25¢; B, 22¢
Common India..... lb., 11@11½¢
Cotton Sash Cord, Tw'ted. 18@20¢
Patent Russia..... lb.... 20¢
Cable Laid Russia..... lb... 21¢
India Hemp, Br'd'd.... lb... 21¢
India Hemp, Twisted.. lb. 13@14¢
Patent India, Twisted.. lb... 17¢
Pearl Braided, cotton, No. 6, ₱ lb, 20½¢; No. 7, 19½¢; Nos. 8 to 12, 19½¢, in 12 doz. to 100 doz. lots.
Eddystone, Braided, Nos. 8 to 12, 26¢; 7, 26½; 6, 27½¢.
Harmony Cable Laid Italian, Nos. 7 to10..... ₱ lb 23¢
Pullman:
Wire Sash Cord..... 10%
Sash Cord Attachments, per 100.. $2.00
Samson, Nos. 8 to 12: (15%)
Braided, ₱ lb., Drab Cotton, 55¢; Italian Hemp, 40¢@50¢; Linen, 65¢; White Cotton, 50¢; Spot Cord..... 50¢
Massachusetts, White... ₱ lb 40¢
Massachusetts, Drab... ₱ lb 45¢
Phoenix, White, Nos 8 to 12.... 27¢
Silver Lake, per lb.:
A, Drab, 45¢; A, White, 40¢; B, Drab, 40¢; B, White, 35¢; Italian Hemp, 40¢; Linen.... 57½¢
See also Chain and Ribbon.

Wire, Picture—

Full Length..... 90@—%
Short Length..... 90&20@—%
Hendryx Standard Wire Picture Cord, old list, 85&10%
Turner & Stanton Co. Wire Picture Cord 90%

Cradles—

Grain 50%

Crayons—

White Round Crayons, Cases, 100 gro., $8.00, $8.50, $9.00 and $10.00 according to grade.
Zelnicker's Lumber: ₱ gro.
White and Purple, Indelible....$7.50
Blue, Red, Green, Yellow and Terra Cotta, $6.50; Black..... $4.50
Giant Lumber, 5¼ in. x 15-16 in. round, all colors, $12.00; Indelibles, $14.00; Blacks..... $10.00
Genuine Soapstone, Metal Workers', 5 in. x ¼ in. Round, $2.50; 5 in. x ¼ in. Square, $1.75; 5 x ½ x 3-16, $2.50; 5 x 1¼ x 3-16..... $3.00
Suremark, Black, $2.25; Blue, Red and Yellow..... $2.50

Crooks, Shepperds'—

American Fork & Hoe Co.:
Montana ..... ₱ doz. $4.50

Crow Bars—See *Bars, Crow.*

Cultivators—

American Fork & Hoe Co.:
Victor Garden..... 50&10%

Cutlery, Table—

International Silver Company:
No. 12 M'd'm Knives, 1847, ₱ doz. $3.50
Star, Eagle, Rogers & Hamilton and Anchor..... ₱ doz. $3.00
Wm. Rogers & Son..... ₱ doz. $2.50

Cutters—Glass—

H. H. Mayhew Co..... 40%
Red Devil..... 60%
B. Mfg. Co..... 40%
Woodward 50%

Meat and Food—

American 30%

Nos.	401	402	403	404	405	406	407
Each	$5	$7	$10	$12	$25	$50	$60

Enterprise:

Nos.	5	10	12	22	32	
Each	$2	$3	$2.75	$4.50	$6	25@25&7½%

No. 202, $1.50..... 40&7½%
P., S. & W. Co.:
Ideal ..... 40@40&5%
Hales ..... 60&5%
Little Giant..... ₱ doz. 40@50%

Nos.	305	310	312	320	322
	$35.00	$48.00	$44.00	$72.00	$68.00

New Triumph No. 605, ₱ doz. $24.00..... 40%
Russwin Food, No. 1, $24.00; No. 2, $27.00; 3, $42.00..... 15&10&10%
$15.00 $18.00
Enterprise Beef Shavers..... 25@30%

Slaw and Kraut—

Henry Disston & Sons:
Slaw and Kraut Cutters..... 35%
Corn Graters..... 30%
J. M. Mast Mfg. Co.:
Slaw Cutters, 1 Knife....₱ doz. $3.00
Combined Slaw Cutter and Corn Grater ..... ₱ doz. $4.00

Tobacco—

All Iron, Cheap...doz, $4.25@4.50
Enterprise ..... 25@30%
National, ₱ doz., No. 1, $21; No. 2, $18 ..... 40%

Diggers, Post Hole, &c—

Disston's:
Rapid, ₱ doz., $24.00..... 25%
Samson, ₱ doz., $34.00..... 25%
Iwan's Pat. Post Hole and Well Auger 40%
Vaughan Pattern Post Hole Augers, ₱ doz., $7.00
Perfection Post Hole Diggers, ₱ doz. $8.50
Split Handle Post Hole Diggers, ₱ doz., $7.50
Hercules Pattern, ₱ doz..... $9.50
Kohler's, ₱ doz., Universal, $14.00; Little Giant, $12.00; Hercules, $10.00; Invincible, $9.00; Rival, $8.50; Pioneer..... $7.50
Never-Break Crucible Steel Post Hole Diggers 60%

Dividers—See *Compasses.*

Drawing Knives—

See *Knives, Drawing.*

Dressers Emery Wheel—

Sterling Emery Wheel Dressers..... 35%
Sterling Wheel Dresser Cutters..... 35%

Drills and Drill Stocks—

Blacksmith's Common Drilling Machines ..... $1.50@1.75
Breast, Millers Falls..... 15&10%
Breast, P., S. & W..... 33⅓
C. & C. Ratchet..... 25%
Reversible Ratchet Die Stocks.... 25%
Goodell Automatic Drills. 50&10@60&10%
Millers Falls Automatic Drills, Graves', per doz., Nos. 1, $4.86; 2, $8.16, 40&10&5%
Millers Falls Automatic Drills, 33⅓&10%
Ratchet, Curtis & Curtis..... 25%
Ratchet, Parker's..... 40%
Ratchet, Weston's..... 40%
Ratchet, Weston's, Style H Improved ..... 40@40&5%
Ratchet, No. 012..... 40@40&5%
Ratchet, Celebrated..... 40@40&5%
Ratchet, Whitney's, P., S. & W. 40&10@50%
Whitney's Adjustable, No. 10, $12.00, 33⅓%

Twist Drills—

Bit Stock..... 70&5@70&10%
Taper and Straight Shank, 60&10@70%

Drivers, Screw—

Screw Driver Bits, per doz. 45@50¢
Balsey's Screw Holder and Driver, ₱ doz., 2½-in., $6; 4-in., $7.50; 6-in., $9 ..... 50%
Buck Bros.' Screw Driver Bits..... 30%
Champion 50%
Disston's 70%
Elmore Tool Mfg. Co.:
Hartford 66⅔%
Indestructible ..... 55&7%
Standard Neverturn..... 66⅔%
Star ..... 75&5%
Screw Driver Bits..... 25%
Fray's Hol. H'dle Sets, No. 3, $12.. 50%
Ford's Brace Screw Drivers.... 40&10%
Gay's Double Action Ratchet..... 35%
Goodell's Auto..... 65@65&10%
Mayhew's Black Handle..... 40%
Mayhew's Monarch..... 40%
Millers Falls, ₱ doz., Nos. 11, $9.95; 12, $13.73; 20, $8.17; 21, $8.46; 41, $13.43; 42, $17.21.
Smith & Hemenway Co., Neverturn, 66⅔%; Elmora, 60%; Star, 30&10%
Swan's:
Nos. 7565 to 7568, 60%; No. 7540, 40&10%

Eave Trough, Galvanized—

Territory.	*Gal. Steel.*	*Copper.*
Northeastern..	*75&10&5%*	*50&10%*
Eastern..	*80%*	*50&10%*
Central..	*80&10&5%*	*50&10%*
Northwestern..	*80&10&5%*	*50&10%*
Western ..	*80&5%*	*50&5%*
Tennessee..	*80&5%*	*50&10%*
Southern..	*75&10%*	*50&5%*
Southwestern..	*75&10&2½%*	*50&5%*

Terms.—2% for cash. Factory shipments generally delivered.
Note.—Lower prices are made in some sections.
See also Conductor Pipe and Elbows.

Elbows and Shoes—

Factory shipments, all territories:

	Galv. Steel,	*Galv. C. I. and Copper.*
Sizes 2, 3, 4		*80%*
Sizes 1½, 2½, 3½, 5, 6		*60&10%*
No. 26		*50%*
No. 24		*25%*
Copper Elbows		*50%*

Elbows, Stove Pipe—

Edwards, Standard Blue.... 40&10&10%
Edwards, Royal Blue..... 40&10&10%
Reeves, Dover, Flat Crimp.. 40&10&5%

Emery, Turkish—

	¼ to ⅛:	*5½ to 220:*	*Flour.*
Kegs ..... lb.	*5 ¢*	*5½¢*	*3½¢*
½ Kegs..... lb.	*5½¢*	*5¾¢*	*3¾¢*
¼ Kegs..... lb.	*5½¢*	*6 ¢*	*4 ¢*

10-lb. cans, 10 in case....6½¢ 7 ¢ 6 ¢
10-lb. cans, less than 10.....10 ¢ 10 ¢ 8 ¢
Less quantity..10 ¢ 10 ¢ 8 ¢

NOTE.—In lots 1 to 3 tons a discount of 10% is given.

Extensions, Bit—
Ford's Auger Bit Extensions....40&5%

Extractors, Lemon Juice—
—See *Squeezers, Lemon.*

Fasteners, Blind—
Zimmerman's Jap'd and Galv., 50 & 5%; Bronze and Plated.....50%
Walling's 50%
Upson's Patent.....40%

Cord and Weight—
Ives, ₱ gro., $1.08.....10%
Titan, ₱ gro., $0.66.....10%

Corrugated—
Acme Corrugated Fasteners.....70%

Faucets—
Cork Lined.....50&10@60%
Metallic Key, Leather Lined, .. 60&10@70%
Red Cedar.....40&5@40&10@45%
Petroleum .....70&10@75%
B. & L. B. Co.:
Metal Key.....60&10%
Star 60%
West Lock.....50&10%
John Sommer's Peerless Tin Key....40%
John Sommer's Boss Tin Key.....50%
John Sommer's Victor Mtl. Key.50&10%
John Sommer's Duplex Metal Key..60%
John Sommer's Diamond Lock.....40%
John Sommer's I.X.L. Cork Lined..50%
John Sommer's Reliable Cork Lined.. 50&10%
John Sommer's Chicago Cork Lined.60%
John Sommer's O. K. Cork Lined...50%
John Sommer's No Brand, Cedar....50%
John Sommer's Perfection, Cedar,...40%
Self Measuring:
Enterprise, Self Measuring and Pump, ₱ doz., $36.00.....40&10%
Lane's, ₱ doz., $36.00.....40&10%
National Measuring, ₱ doz. $36.40&10%

Felloe Plates—
See *Plates, Felloe.*

Files— Domestic—
List Nov. 1, 1899.
Best Brands.....70&10@75&10%
Standard Brands.....75&10@80%
Lower Grade....75&10&10@80&10%
Gold Medal.....70%
McCaffrey's American Standard, 60&10&10%

Imported—
Stubs' Tapers, Stubs' list, July 24, '97.....33⅓@40%

Fixtures, Fire Door—
Richards Mfg. Co.:
Universal, No. 103; Special, No. 104 .....$3.75
Fusible Links, No. 96.....50%
Expansion Bolts, No. 107.....60&10%

Grindstone—
Net Prices:

Inch	*15*	*17*	*19*	*21*
Per doz.	*$3.60*	*3.85*	*4.15*	*4.65*

Peck, Stow & Wilcox Co.:

In.	15	17	19	21	24
	$4.00	4.40	4.75	5.50	6.50....30%

Reading Hardware Co.....60%

Fodder Squeezers—
See *Compressors.*

Forks—
American Fork & Hoe Co.:
Iowa Dig-Ezy Potato.....70&5%
Hay, Regular, 3-tine....45&20&12½
Hay, Regular, 4-tine.....60&7½&5%
Champion, Hay.....60&12½
Acme, Hay.....60&20
Manure, Regular, 4-tine.....65&5
Manure, Regular, 5 and 6 tine....70
Champion, Manure.....65&5
Columbia, Manure.....70
Acme, 4-tine.....60&10&5
Round Shoulder Header, 4-tine..65
Champion, Header.....65
Dakota, Header.....65
Kansas Header.....65
Wood, Barley.....35&5
Steel, Barley.....66⅔
Columbia, Spading.....70&7½&5%

Frames— Wood Saw—
White, S'g't Bar, per doz.75@80¢
Red, S'g't Bar, per doz.$1.00@1.25
Red, Dbl. Brace, per doz.$1.40@1.50

Freezers, Ice Cream—

Qt.....	*1*	*2*	*3*	*4*	*6*
Each....	*$1.25*	*$1.60*	*$1.90*	*$2.20*	*$2.80*

Fruit and Jelly Presses—
See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse— *Per 1000 Feet.*
Hemp $2.75
Cotton 5.20
Waterproof Sgl. Taped..3.65
Waterproof Dbl. Taped..4.40
Waterproof Tpl. Taped..5.15
10&2½%

Gates, Molasses and Oil—
Stebbins' Pattern.....80@80&5%

Gauges—
Marking, Mortise, &c..50@50&10%
Chapin-Stephens Co.:
Marking, Mortise, &c.....50&50&10%
Disston's Marking, Mortise, &c..67½
Wire, Brown & Sharpe's.....33⅓%
Wire, Morse's.....25%
Wire, P., S. & W. Co.....33⅓%

Gimlets— Single Cut—
Numbered assortments, per gro.
Nail, Metal, No. 1, $2.00; 2, $2.30
Spike, Metal, No. 1, $4.00; 2, $4.30
Nail, Wood Handled, No. 1, $2.30; 2, $2.60
Spike, Wood Handled, No. 1, $4.30; 2, $4.60

Glass, American Window
See *Trade Report.*

Glasses, Level—
Chapin-Stephens Co.....65@65&10%

Glue, Liquid Fish—
Bottles or Cans, with Brush, 25&10@50%
Elwell's 40%

Grease, Axle—
Common Grade...gro. $6.00@$6.50
Dixon's Everlasting, 10-lb. pails, en. 85¢; in boxes, ₱ doz., 1 lb, $1.20; 2 lb.....$2.00
Helmet Hard Oil.....25%

Griddles, Soapstone—
Pike Mfg. Co.....33⅓&33⅓&10%

Grinders—
Pike Mfg. Co.:
Hand and Foot Power, Pyko Nos. 1, 2, 3; Pyko Primo; Pyko Peerless; Pyko Spiral (foot power).33⅓%
Mower Knife and Tool, $5.00..40&10%
Royal Mfg. Co.:
Alundum Grinding Machines, each, Nos. 01, $1.75; 1A, $2.50; 10, $5.00 .....30%
Alundum Sickle Grinders, each, Nos. 20, $3.00; 20A, $6.00; 20A Combined, $6.50.....30%
Alundum Disc Grinders, each, $2.50 .....30%

Grindstones—
Pike Mfg. Co.:
Improved Family Grindstones, ₱ inch, ₱ doz., $2.00.....33⅓%
Richards Mfg. Co., Eli and Cycle, Ball Bearing, mounted.....40%

Grips, Nipple—
Perfect Nipple Grips.....40&10&2%

Halters and Ties—
Cow Ties.....70%
Bridgeport Chain Co.:
Triumph Coil and Halters,35&2½@40%
Brown Coil and Halters..45@50&5%
Brown Cow Ties.....50&5@50&10&5%
Brown Tie Outs.....70&10@75&5%
Covert Mfg. Co.:
Web .....30&2%
Jute Rope.....35%
Sisal Rope.....20%
Cotton Rope.....45%
Hemp Rope.....45%
Oneida Community:
Am. Coil and Halters.....40@40&5%
Am. Cow Ties.....45@50%
Niagara Coil and Halters...45@50&5%
Niagara Cow Ties.....45&5@50&10&5%

Hammers—
Handled Hammers—
Heller's Machinists'....55&10@55&10&5%
Heller's Farriers.....40&5@40&10&5%
Peck, Stow & Wilcox Co.:
Crucible Steel.....40&10@50%
Farriers' .....40&10@50%
Riveting .....40&10@50%
Machinists' .....66⅔@5%
Blacksmiths' 50%
Fayatte R. Plumb:
A. E. Nail.....40&2½@40&12½%
Eng. and B. S. Hand.50&10&5@60&5%
Machinists' Hammers.....60&10&5%
Rivet and Tinners'.40&7½@40&12½&5%
Victor Magnetic Tack, ₱ gro....$7.75

Heavy Hammers and Sledges—
Under 3 lb., per lb., 50¢...80&10%
3 to 5 lb., per lb., 40¢...80&10&10%
Over 5 lb., per lb., 30¢.....
Over 5 lb., per lb., 30¢.80&10&10%

Handles—
Agricultural Tool Handles
Axe, Pick, &c....60&10@60&10&5%
Hoe, Rake, &c.....40%
Fork, Shovel, Spade, &c.:
Long Handles.....40%
D Handles.....40%

Cross-Cut Saw Handles—
Atkins' 40%
Champion 50%
Disston's 50%

Mechanics' Tool Handles—
Auger, assorted...gro.$3.00@$3.50
Brad Awl.....gro.$1.65@$1.75
Chisel Handles, Ass'd, per gro.:
Tanged Firmer, Apple, $2.40@ $2.65; Hickory.....$2.15@2.40
Socket Firming, Apple, $1.75@ $1.95; Hickory.....1.60@1.75
Socket Framing, Hickory, $1.60@$1.75
File, assorted.....gro.$1.30@$1.40
Hammer, Hatchet, &c., 60&10@60&10&5%
Hand Saw, Varnished, doz., 80¢ 85¢; Not Varnished.....65@75¢
Plane Handles:
Jack, doz., 30¢; Fore, doz...45¢
Chapin-Stephens Co.:
Carving Tool.....30@30&10%
Chisel .....60@60&10%
File and Awl.....60@60&10%
Saw and Plane.....30@30&10%
Screw Driver.....30@30&10%
Millers Falls Adj. and Ratchet Auger Handles .....15&10%
Nicholson Simplicity File Handle.... ₱ gro. $0.85@$1.50
J. L. Osgood:
Indestructible File and Tool, ₱ gro., No. 1, $8.00; No. 2, $8.50; No. 3, $9.00; No. 4, $9.50; No. 5, $10.00.....gro. lots 10%
W. A. Zelnicker Supply Co.:
Hammer, ₱ doz., 12 in., $2.00; 14 in., $2.00; 16 in., $2.30; 18 12., $2.50; 20 in., $2.70; 22 in., $3.00; 24 in., $3.30; 26 in., $3.50; 30 in., $3.80.
Sledge, ₱ doz., oval, 30 in., $3.80; octagon, 30 in., $3.80; oval, 36 in., $4.00; octagon, 36 in., $4.00.
Axe, ₱ doz., 28 to 34 in., $5.60; 36 in., $5.80.
Adze, ₱ doz., 36 in., $5.80; 36 in., $7.80.
Pick, ₱ doz., R. R., 36 in., $8.00; coal, 34 in., $5.80.
Hatchet, ₱ doz., 12 to 14 in., $2.00.
50&10% often given.

Hangers—
NOTE.—Barn Door Hangers are generally quoted per pair, without track and Parlor Door Hangers per double set with track, &c.
Chicago Spring Butt Co.:
Friction 25%
Oscillating 25%
Big Twin.....25%
Chisholm & Moore Mfg. Co.:
Baggage Car Door.....50%
Elevator 30%
Railroad 50%
Cronk & Carrier Mfg. Co.:
Loose Axle.....60&10%
Roller Bearing.....70%
Griffin Mfg. Co.:
Solid Axle, No. 10, $12.00..60&10%
Roller Bearing, No. 11, $15.00, 60&10%
Roller Bearing, Ex. Hy., No. 22, $18.00.....60&10%
Bull Dog, $24.00.....70%
Lane Bros. Co.:
Parlor, Ball Bearing, $1.00; Standard, $3.15; No. 105, $2.85; New Model, $2.80; New Champion per set of 4 Hangers, complete with track.....$2.25
Barn Door, Standard.....60&10%
Hinged .....net $6.08
Covered .....60&5%
Special .....70&5%
Trolley Hangers and track ..50%
Lawrence Bros.:
Cleveland .....70&7½%
Clipper, No. 75.....60%
Crown .....55&10%
Cyclone, No. 40.....net $6.50
Tandem, No. 50.....net $7.50
New York.....55&10%
Trolley, No. 30, ₱ pair.....$1.25
McKinney Mfg. Co.:
Roller Bearing, Nos. 1 and 2.70%
Anti-Friction 60%
Hinged Hangers, King Charm.60%
Richards Mfg. Co.:
Hangers, Nos. 47, 48, 147, 247, 60&5%
Pioneer Wood Track, No. 3..$2.25
Roller B'r'g St'l Track No. 12.$2.20
Roller B'r'g St'l Track No. 13.$2.50
Roller B'r'g, Nos. 39, 41, 43, 70&7½%
Hero, Adj. Track No. 19..50&10%
Adjustable Track Tandem Trolley Track No. 16.....50&10%
Seal, Steel Track No. 8.....$2.25
Auto Adj. Track No. 22..50&5%
Trolley B. D. No. 17, $1.25; F. D. No. 129, $2.25; No. 121, $2.45; No. 150.....$2.50
Safety Underwriters F. D. No. 101 .....50%
Tandem No. 44..2½ and 3 60&10%
Palace, Adjustable Track No. 132 .....50&5%
Royal, Adjustable Track No. 122 .....50&10%
Ives' Wood Track No. 1.....$2.25
Trolley B. D. No. 20.....50&10%
Trolley B. D. No. 24, $1.30; No. 27, $1.40; No. 28.....$1.60
Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2.70&7½%
Anti-friction, No. 42; No. 44, sizes 2½ and 3.....60%
Hinged Tandem No. 48....60&5%
Folding Door B. B. Swivel No. 135 .....40%
Taylor & Boggis F'y Co.'s Kidder's Roller Bearing, ₱ doz., 4 in., $12.00; 5 in., $14.00..40&10%
Myers' Stayon Hangers.....60%
Extra 5&10% often given.

Hangers— Garment—
Pullman Trouser, ₱ gro. No. 1 $9.00; No. 4, $24.00; No. 5, $16.50; No. 8, Black Enamel, $7.50; No. 10, $21.00; No. 12, $8.00; No. 15, Rods, $9.00; No. 18, Loops.....$10.00
Victor Folding.....₱ gro. $9.60

Gate—
Myers' Patent Gate Hangers, ₱ doz. net 50%

Joist and Timber—
Lane Bros. Co.....35%

Hasps—
Griffin's Security Hasp.....50&10%
McKinney's Perfect Hasp, ₱ doz..60%

Hatchets—
Regular list, first qual.40&12½@—
Second quality.....50&10&5@—

Heaters, Carriage—
Clark, No. 5, $1.25; No. 5B, $1.50; No. 3, $1.75; No. 3D, $2.00; No. 7D, $2.25; No. 3E, $2.50; No. 1, $3.00.....25%
Clark Coal, ₱ doz., $0.75.....20%

Hinges—
Blind and Shutter Hinges
Surface Gravity Locking Blind:
Doz. Sets with Fastenings, No. 1, $0.70; No. 3, $1.25; No. 5, $2.65.
Mortise Shutter.....80%
Mortise Reversible Shutter..80%
North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50.....10%
Charles Parker Co.....70&75%
Parker Wire Goods Co.
Hale & Benjamin Automatic Blind Hinges 20%
Hale's Blind Awning Hinges, No. 110, for wood, $9.00; No. 111, for brick, $9.00.....20%
Reading's Gravity.....60%
Stanley's Steel Gravity Blind Hinges No. 1647½, ₱ doz. sets, without screws, $0.95; with screws, $1.25.
Wrightsville Hardware Co.:
O. S. Lull & Porter.....75&5%
Acme, Lull & Porter.....75%
Queen City Reversible.....75%
Shepard's Noiseless, Nos. 60, 65, 55 .....75&5%
Niagara, Gravity Locking, Nos. 1, 3 & 5.....75&5%
Clark's O. P., No. 1.....75&10%
Clark's O. P., Nos. 3 and 5....75&5%
Tip Pat'n, No. 1.....75&10%
Clark's No. 3.....75&5%
Buffalo Gravity Locking, Nos. 1, 3 & 5.....70&10&5%
Shepard's Double Locking.....75%
Champion Gravity Locking.....75&5%
Pioneer .....75&10%
Empire 65%
W. H. Co.'s Mortise Gravity Locking, No. 2.....60&10%

Gate Hinges—
Clark's or Shepard's—Doz. sets:

No.	*1*	*2*	*3*
Hinges with L't'chs	*$2.00*	*2.50*	*3.00*
Hinges only	*1.25*	*1.90*	*3.50*
Latches only	*.70*	*.75*	*.35*

New England:
With Latch.....doz..@$2.00
Without Latch.....doz..@$1.60
Reversible Self-Closing:
With Latch.....doz..@$1.75
Without Latch...doz. ...@$1.35
Western:
With Latch.....doz. $1.75
Without Latch.....doz..$1.15
Wrightsville Hardware Co.:
Shepard's or Clark's Hinges and Latches, Hinges only or Latches only, Nos. 1, 2 or 3.....70%

Miscellaneous—
Griffin Mfg. Co., Fleur de Lis Surface Hinges, ₱ doz. prs.....$1.00

Pivot Hinges—
Bommer Bros. Pivot, Ball Bearing 40%
Lawson Mfg. Co. Matchless.....30%

Spring Hinges—
Holdback, Cast Iron...$6.75@$7.00
Non-Holdback, C'st Iron$6.50@$6.75
J. Bardsley:
Bardsley's Non-Checking Mortise Floor Hinges.....40%
Bardsley's Patent Checking.33⅓%
Bommer Bros.:
Spring Butt Hinges.....40%
Surface Floor, Ball Bearing 40%
Mortise Floor, Ball Bearing.40%
Lavatory Hinges.....40%
Non-Holdback Screen Door, Nos. 2000 and 900.....40%
Holdback Screen Door, No. 999.....₱ gro, $9.00
Chicago Spring Butt Co.:
Chicago Spring Hinges.....25%
Triple End Spring Hinges....50%
Chicago (Ball Bearing) Floor.50%
Garden City Engine House...25%
Keene's Saloon Door.....25%
Columbian Hardware Co.:
Acme, Wrought Steel.....30%
Acme, Brass.....25%
American 30%
Columbia, ₱ gr., No. 14, $9.00; No. 18.....$25.00
Columbia, Adj., No. 7, ₱ gr. $12.00
Gem, new list.....30%
Clover Leaf and Acorn, per gro. $12.00
Oxford, new list.....30%
Floor Spring Hinges.....65&10%
Columbian Steel.....65&10%
Lawson Mfg. Co.:
Matchless Spring Hinges.....30%
Matchless Jamb Hinges.....30%
Richards Mfg. Co.:
Superior Double Acting Floor Hinges 40%
Shelby Spring Hinge Co.:
Buckeye All Steel Holdback Screen Door.....₱ gr. $9.00
Chief Ball Bearings Floor Hinge 50%
Ball Bearing Door.....25%
No. 777, Sheet Steel Holdb'k, ₱ gr. pr.....$9.00
Standard Mfg. Co.:
Champion Double Acting Door Hinge .....25&10&10%
Standard Double Acting Floor Hinge .....25&10&10%
Superior Spring Hinge Co.:
Superior Floor Hinges.....33⅓%
Spring Hinges.....33⅓%
Extra 10% often given on most of these Hinges.

Wrought Iron Hinges—
Strap and T Hinges, &c., list February 10, 1908:
Light Strap Hinges..50&10%
Heavy Strap Hinges..60&5%
Light T Hinges.....50%
Heavy T Hinges.....40%
Extra Hvy. T Hinges.50&10%
Hinge Hasps.....33⅓%
Cor. Heavy Strap....60&5%
Cor. Ex. Heavy T...50&10%
Extra 10&7½%.

Screw Hook and Strap.	*6 to 12 in..*	*lb. 3½¢*
	1½ to 20 in..	*lb. 3½¢*
	22 to 36 in..	*lb. 3 ¢*

Screw Hook and Eye:
3, to 1 inch.....lb. 6¼¢
⅝-inch .....lb. 7½¢
½-inch .....lb. 8½¢

Hitchers, Stall—
Covert Mfg. Co., Stall Hitchers..30&2%

Hods— Coal—
M'f'gr's list, price per gross:

Inch	*15*	*16*	*17*	*18*
Galv. Open	*$35*	*$39*	*$42*	*$46*
Jap. Open	*26*	*28*	*31*	*35*
Galv. Funnel	*48*	*48*	*52*	*56*
Jap. Funnel	*33*	*36*	*39*	*43*

10&7½&5%

Masons' Etc.
Cleveland Wire Spring Co.:
Steel Brick, No. 162.....each $1.05
Steel Mortar, No. 158.....each $1.35

Hoes— Eye-

Scovil and Oval Pattern,
60&10@60&10&10%
Grub, list Feb. 23, 1899,
70&10@70&10&10%
D. & H. Scovil.....27½%
Am. Fork & Hoe Co. (Scovil Pattern).....60&5%

Handled—

Cronk's Weeding, No. 1, $2.00; No. 2, $2.50
Star Double Bit.....$2.50
American Fork & Hoe Co.:
Regular, Cotton.....75&10&5&2½
Crescent, Cultivator.....75&2½
Mattock, Senior.....70
Mattock, Junior.....70
Sprouting.....50
Tobacco, Harper's.....66⅔&15&10
Warren.....55&10&10&5
Ivanhoe.....65&15&10
Cultivator, B B 6.....70&10&10&5
Cultivator, B B 6½.....70&10&10&5
Weeding, Acme.....72½&10&2½
Scuffle, Lightning.....60&5%

Hoisting Apparatus—

See *Machines, Hoisting.*

Holders— Bit—

Angular, ₱ doz. $24.00.....45&10%

Door—

Bardsley's, Iron, 40%; Brass and Bronze.....25%
Empire.....50%
Pullman.....25%
Richards Mfg. Co.: No. 117, Ever-ready, 40%; Nos. 118, 119, Sure Grip.....50%
Superior.....33⅓%

File and Tool—

Nicholson File Holders and File Handles.....33⅓@40%

Fruit Jar—

Triumph Fruit Jar Holder, ₱ gross, $18.00; ₱ doz.....$2.00

Trace and Rein—

Fernald Double Trace Holder, ₱ doz. pairs.....$1.25
Dash Rein Holder, ₱ doz.....$1.25

Hones—Razor—

Pike Mfg. Co., Belgian and Swaty, 50%; German.....33⅓%

Hooks—Cast Iron—

Bird Cage, Reading.....40%
Clothes Line, Reading List.....40%
Coat and Hat, Reading.....45&20%
Coat and Hat, Wrightsville.....60&5%
Harness, Reading List.....40%

Wire—

Belt, Nos. 1 to 15....75&10@80%
Wire C. & H. Hooks..80@80&10%
Bradley Metal Clasp Wire, Coat and Hat. 75&10@80%; Ceiling..75&10@80%
Columbian Hdw. Co., Gem.....75&10%
Parker Wire Goods Co., King..75&10%
Wire Goods Co.:
Acme, 60&10%; Chief, 70&10%; Crown, 75%; Czar, 65&10%; V Brace, 75%; Czar Harness, 50%; Ceiling, 75%.

Wrought Iron—

Box, 6 in., per doz., $0.90; 8 in., $1.15.
Cotton.....doz. $1.25@$1.50
Wrought Staples, Hooks, &c.—
See Wrought Goods.

Miscellaneous—

Hooks, Bench, see *Stops, Bench.*
Rush, Light, doz., $6.20; Medium, $6.75; Heavy, $7.65
Grass, best, all sizes, per doz., $2.75@$3.00
Grass, common grades, all sizes, per doz.....$1.25@$1.50
Whiffletree.....lb. 5¾@6¢
Hooks and Eyes:
Brass.....60@60&10%
Malleable Iron.....70@70&10%
Covert Mfg. Co. Gate and Scuttle Hooks.....40%
Turner & Stanton Co. Cup and Shoulder.....85&10%
Bench Hooks—See Bench Stops.
Corn Hooks—See Knives, Corn.

Horse Nails—

See *Nails, Horse.*

Horseshoes—

See *Shoes, Horses.*

Hose, Rubber—

Garden Hose, ¾-inch:
Competition.....ft. 6@6¼¢
3 ply Guaranteed.....ft. 8½@9¢
4-ply Guaranteed....ft. 9½@12¢
Cotton Garden, ¾-in., coupled:
Low Grade.....ft. 8@ 9c
Fair Quality.....ft. 10@11¢

Irons— Sad—

From 4 to 10.....lb. 2½@2¾¢
B. B. Sad Irons.....lb. 3¼@3½¢
Mrs. Potts', cents per set:

	Nos. 50	55	60	65
Jap'd Caps	.86	93	96	93
Tin'd Caps	.91	88	1.01	98

New England Pressing..lb. 3¾@4¢

Bar and Corner—

Richards Mfg. Co., Bar, 60&10%; Corner.....60%

Pinking—

Pinking Irons.....doz. @$3¢

Irons, Soldering

See *Coppers.*

Jacks, Wagons—

Covert Mfg. Co.:
Auto Screw.....30&2%; Steel, 45%
Lockport.....50%
Lane's Steel.....30&5%
Richards' Tiger Steel, No. 130...50&10%
Smith & Hemenway Co.'s.....25%

Ladder—

Richards Mfg. Co., Ladder Jacks..50%

Jointers—

Pike Mfg. Co., Saw Jointers, $7.00..40%

Kettles—

Brass, Spun, Plain.....20@25%
Enameled and Cast Iron—See Ware, Hollow.

Knives—

Butcher, Kitchen, &c.—

Foster Bros.' Butcher, &c.....30%
Wilkinson Shear & Cutlery Co....60%

Corn—

Columbian Cutlery Co., Wilcut Brand Knives and Hooks.....60%
American Fork & Hoe Co.:
Easy Cut, ₱ doz., No. 10 C H...$2.10
Easy Cut, ₱ doz., No. 10 B C H.$2.20
Acme, ₱ doz.....$2.35
Dent, ₱ doz.....$2.35
Adjustable, Serrated, ₱ doz.....$1.90
Serrated, ₱ doz.....$1.85
Yankee, No. 1 C H.....$1.35
Yankee, No. 2 C H.....$1.15

Drawing—

Standard List.....80&10@—%
C. E. Jennings & Co., Nos. 45, 46, 25&7½%
Jennings & Griffin, Nos. 41, 42, 66⅔&7½%
Swan's.....66⅔@70%
Watrous.....16⅔%
L. & I. J. White.....20&5@25%

Hay and Straw—

Serrated Edge, per doz. $5.00@5.50
Iwan's Sickle Edge.....₱ doz. $9.50
Iwan's Serrated.....₱ doz. $10.00

Miscellaneous—

Farriers' .....doz. $2.60@3.55
Wostenholm's .....₱ doz. $3.00@3.25

Knobs—

Base, 2½-inch, Birch or Maple, Rubber Tip.....gro. $1.25@1.40
Carriage, Jap., Drive, all sizes, gro. 35@40¢
Door, Mineral.....doz. 65@70¢
Door, Por. Jap'd.....doz. 70@75¢
Door, Por. Nickel..doz. $2.05@2.15
Bardsley's Wood Door, Shutters, &c. 15%

Lacing, Leather—

See *Belting, Leather*

Ladders, Store, &c.—

Lane's Store.....25%
Myers' Noiseless Store Ladders....50%
Richards Mfg. Co.:
Improved Noiseless, No. 112.....50%
Climax Shelf, No. 113.....50%
Trolley, No. 109.....50%

Ladles, Melting—

L. & G. Mfg. Co., Melting and Plumbers'.....25%
P., S. & W.....40&10%
Reading.....60%

Lamps,—

Hammer's M. I. Hand.....45%

Lanterns—Tubular—

Regular, No. 0.....doz. $4.35@4.50
Side Lift, No. 0....doz. $4.60@4.75
Hinge Globe, No. 0.doz. $4.60@4.75
Other Styles.....40@40&10%

Bull's Eye Police—

3-inch .....$3.75@4.00

Latches— Thumb—

Roggin's Latches, Jap'd, with Screws .....doz. 35@40¢

Door—

Cronk & Carrier Mfg. Co., No. 101, ₱ doz. $2.00
Richards' Bull Dog, Heavy, No. 125.....50&5%
Richards' Trump, No. 127.....$4.50

Leaders, Cattle—

Small.....doz. 50¢; large, 60¢
Covert Mfg. Co.:
Cotton, 45%; Hemp, 45%; Jute, 35%; Sisal, 20%.

Leathers, Pump—

See *Pumps.*

Lifters, Transom—

R. & E.....10%

Lines—

Wire Clothes, Nos.	*18*	*19*	*20*
100 feet	*$2.30*	*1.95*	*1.75*
75 feet	*$1.95*	*1.65*	*1.50*

Samson Cordage Works:
Solid Braided Chalk, Nos. 0 to 3..40%
Solid Braided Masons'.....30%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50.....₱ gr. 20%
Masons' Lines, Shade Cord, &c.; White Cotton, No. 3½, $1.50; No. 4, $2.00; No. 4½, $2.50; Colors, No. 3½, $1.75; No. 4, $2.25; No. 4½, $2.75; Linen, No. 3½, $2.50; No. 4, $3.50; No. 4½, $4.50.....20%
Tent and Awning Lines: No. 5, White Cotton, $7.50; Drab Cotton, $8.50.....20%
Clothes Lines, White Cotton: 50 ft., $2.75; 60 ft., $3.25; 70 ft., $3.75; 75 ft., $4.00; 80 ft., $4.25; 90 ft., $4.75; 100 ft., $5.25.....20%
Turner & Stanton Co.:
Solid Braided Chalk, Masons' and Awning Lines.....40%
Clothes Lines, White Cotton....20%
Shade Cord, Cotton or Linen....20%

Locks— Cabinet—

Cabinet Locks....33⅓@33⅓&7%

Door Locks, Latches, &c.—

NOTE.—Net Prices are very often made on these goods.
Reading Hardware Co.....40%
R. & E. Mfg. Co.....10%

Padlocks—

R. & E. Mfg. Co. Wrought Steel and Brass.....75&10%

Sash, &c.—

Ives' Patent:
Crescent.....10%
Automatic Gravity Metal Sash, ₱ gro., $149.58.....10%
Window Ventilating.....10%
Pullman Patent Ventilating Lock..25%
Reading Sash Locks.....40%
Taylor Mfg. Co., Perfect Ventilating, ₱ doz.....$0.75@$1.00

Machines—Boring—

Com. Upr't, without Augers, $2.00@2.25
Com. Angl'r, without Augers, $2.25@2.50
Ford Auger Bit Co.....$22.00
Jennings', Nos. 1 and 4.....25&7½%
Millers' Falls.....5.75
Snell's, Upright, $2.65; Angular, $2.90
Swan's Improved.....40&10%

Corking—

Reisinger Invincible Hand Power...
₱ doz. $18.00

Fence—

Williams' Fence Machines....each, $5.50

Hoisting—

Moore's Anti-Friction Chain Hoist.30%
Moore's Hand Hoist, with Lock Brake.....20%
Moore's Cyclone High Speed Chain Hoist.....25%

Ice Cutting—

Chandler's.....12½%

Washing

Boss Washing Machine Co.: Per doz.
Boss No. 1.....$57.00
Boss Rotary.....$57.00
Champion Rotary Banner No. 1.$57.00
Standard Champion No. 1.....$50.00
Standard Perfection.....$27.00
Cincinnati Square Western.....$33.00
Uneeda American, Round.....$33.60

Mallets—

Hickory.....45&5@50%
Lignumvitæ.....45&5@50%
Tinners' Hickory and Applewood.....doz. 45&5@50%

Mangers, Stable—

Swett Iron Works.....50%

Mats, Door—

Acme Flexible Steel.....50%
Elastic Steel (W. G. Co.), new list.50%

Mattocks—

See *Picks and Mattocks.*

Milk Cans—See *Cans, Milk.*

Mills, Coffee, &c.—

Enterprise Mfg. Co.:
Coffee.....20@25%
Shell and Corn.....25&10%
National list Jan. 1, 1902.....30%
Parker's Columbia and Victoria..33⅓%
Parker's Box and Side.....50&10%
Swift, Lane Bros. Co.....30%

Motors, Water—

Divine's Red Devil.....30%

$2.50	3.50	10.00	15.00	33⅓%
No. 1.	2	3	4	

Lippincott's:

No.	1	2	3	4	
	$2.50	3.50	10.00	15.00	33⅓%

Pike Mfg. Co., Tool and Knife Grinding.....33⅓%

Mowers, Lawn—

NOTE.—Net prices are generally quoted
Cheapest, 10-in., $2.00; advance 10¢ for each size.
Cheap, 10-in., $2.25; advance 15@20¢ for each size.
Better Grade, 10-in., $3.00; advance 25¢ for each size.

	12	*14*	*16*	*18 in.*
High Grade...	*$4.50*	*4.75*	*5.00*	*5.25*

Continental.....60%
Great American.....70%
Great American Ball B'r'g, new list.70%
Quaker City.....70%
Pennsylvania.....60%
Pennsylvania, Jr., Ball Bearing. 50&10&5%
Pennsylvania Golf.....50%
Pennsylvania Horse.....33⅓&5%
Pennsylvania Pony.....40&5%

Nails—

Wire Nails and Brads, Miscellaneous .....85&5@85&10%
Cut and Wire. See *Trade Report.*
Hungarian, Finishing, Upholsterers', &c. See *Tacks.*

Horse—

Nos.	6	7	8	9	10	
Anchor	23	21	20	19	18	.. ₱ lb, net, 12¢
Coleman	13	12	12	11	11	net ₱ lb
New Haven..	23	21	20	19	18	.. ₱ lb, net, 12¢
Livingston ..	19	18	17	16	16	.....10%

Western.....₱ lb 8½¢
Jobbers' Special Brands, per lb. 9¢

Picture—

	1½	2	2½	3 in.
Brass Hd. gro.	*.45*	*.55*	*.60*	*.70*
Por. Head, gro.	*..*	*1.10*	*1.10*	*1.10*

Upholsters—

Brass.....30%
Plated.....30&10%

Nippers—

See *Pliers and Nippers.*

Nipples—

Standard Nipple Co.:
Wrought Pipe Nipples.....80%

Nuts— *Blank or Tapped.*

Cold Punched: Off list.
Square.....5.30¢
Hexagon.....5.90¢
Square, C., T. & R.....5.70¢
Hexagon, C., T. & R.....6.50¢
Hot Pressed: Off list.
Square.....5.80¢
Hexagon.....6.30¢

Oakum—

Best .....lb. 6½¢
U. S. Navy.....lb. 6 ¢
Navy .....lb. 5 ¢
Plumbers' Spun Oakum..2¾@3 ¢

Oil—

Pike Mfg. Co., Stonoil.....40%

Oil Tanks—See *Tanks, Oil.*

Oilers—

Steel, Copper Plated.....75&10%
Chase or Paragon:
Brass and Copper.....50&10%
Zinc .....65&10@70%
Railroad .....60&10&10%
Malleable, Hammers' Improved, Nos. 11, 12 and 13, 10%; Old Pattern, Nos. 1, 2, 3, 4, 50%.
American Tube & Stamping Co.:
Spring Bottom Cans.....70@70&10%
Railroad Oilers, &c.....60@60&10%
Maple City Mfg. Co.:
Spring Bottom Cans.....70@70&10%
Railroad Oilers, &c.....60@60&10%

Openers—Packing Box—

Herculever, ₱ doz., $24.....30%

Can Openers—

Per doz.
Sprague, Iron Handle....30@35¢
Sprague, Wood Handle.....40¢
Sardine Scissors.....$1.75@3.00
Can and Bottle Openers, ₱ doz., net: Yankee, $0.75@$0.85; Little Gem, $0.50@$0.65; Nifty.....$0.75

Egg—

Hartigan Nickel Plate, ₱ doz., $2.00; Silver Plate, $4.00.

Packing—

Asbestos Packing, Wick and Rope, any quantity.....18@20¢

Rubber—

(Fair quality goods.)
Sheet, C. I.....11@12¢
Sheet, C. O. S.....11@12¢
Sheet, C. B. S.....12@13¢
Sheet, Pure Gum.....40@45¢
Sheet, Red.....40@50¢
Jenkins' '96, ₱ lb, 80¢.....25%

Miscellaneous—

American Packing....lb. 7@10 ¢
Cotton Packing.....lb. 16@25 ¢
Italian Packing.....lb. 9@10¢
Jute .....lb. 4@4¼¢
Russia Packing.....lb. 9@10¢

Pails, Water, Well, &c.—

See *Buckets.*

Paint—

Dixon's Silica-Graphite, in 1 gal. pails and 5 gal. kegs, 25%; packages of larger size.....20%

Pans— Dripping—

Standard List.....75%
Edwards, Royal Blue.....75%

Fry—

Common Lipped:

Nos.	*1*	*2*	*3*	*4*	*5*
Per doz....	*$0.75*	*0.85*	*0.95*	*1.15*	*1.30*

Refrigerator, Galva.—

Inch	*12*	*14*	*16*	*18*
Per doz....	*$1.75*	*2.25*	*2.80*	*3.15*

Paper—Building Paper

Asbestos: lb.
Roll Board or Building Felt, 6 to 30 lb., per 100 sq. ft..2½¢
Roll Board or Building Felt, 3-32 and ⅛ in., 45 to 60 lb., per 100 sq. ft.....3½¢
Mill Board, Sheet, 40 x 40 in., 1-32 to ½ in.....3¢
Per roll.
Rosin Sized Sheathing: 500 sq. ft. Light weight, 25 lbs. to roll, 48@58¢
Medium weight, 30 lbs. to roll, 56@70¢
Heavy weight, 40 lbs. to roll, 75@78¢
Black Water Proof Sheathing, 500 sq. ft., 1 ply, 65¢; 2 ply, 85¢; 3 ply, $1.10; 4 ply, $1.25.
Deafening Felt, 9, 6 and 4½ sq. ft. to lb., ton.....$54.50
Red Rope Roofing, 250 sq. ft. per roll.....$1.75

Tarred Paper—

1 ply (roll 400 sq. ft.), ton. $34.00@$38.00
2 ply, roll 108 sq. ft.....65¢
3 ply, roll 108 sq. ft.....88¢
Slater's Felt (roll 500 sq. ft.).80¢

Sand Paper and Cloth—

Flint and Emery.....50&10%
Garnet Paper and Cloth.....25%

Parers—Apple—

Goodell Co.:

Family Bay State	₱ doz. $15.00
Improved Bay State	₱ doz. $36.00
New Lightning	₱ doz. $7.00
Turn Table '98	₱ doz. $6.00
White Mountain	₱ doz. $5.00
Bonanza Improved	each $7.50
Dandy	each $10.00
Eureka Improved	each $20.00
New Century	each $20.00
Ranger	each $30.00

Livingston Nail Co.:
Daisy ..... ℔ doz. $4.00
Little Star ..... ℔ doz. $5.00
Rocking Table ..... ℔ doz. $6.20
Reading Hardware Co.:
Advance ..... ℔ doz. $4.00
Baldwin ..... ℔ doz. $4.00
Reading 72 ..... ℔ doz. $5.25
Reading 78 ..... ℔ doz. $6.25

Orange—
Goodell Co., Success ..... each $20.00

Potato—
Saratoga ..... ℔ doz. $7.00
White Mountain ..... ℔ doz. $6.00

Picks and Mattocks—
(List Jan., 1908.)
List ..... 75&10%
Cronk's Handled Garden Mattock, ℔ doz., $5.00 ..... 33⅓%

Pinking Irons—
See *Irons, Pinking.*

Pins, Escutcheon—
Brass ..... 50@50&10%
Iron, list Nov. 11, '85 .. 60@60&10%

Pipe, Cast Iron Soil—
Standard, 2-6 in. ..... 70&10%
Extra Heavy, 2-6 in. .. 75&10@80%
Fittings, Standard and Heavy, 80&10@85%

Pipe, Merchant—
Carloads to Consumers:

	Steel. Blk.	Steel. Galv.	Iron. Blk.	Iron. Galv.
	%	%	%	%
⅛ and ¼ in.	66	50	64	..
⅜ in.	68	54	66	52
½ in.	70	58	68	56
¾ to 6 in.	74	64	72	62
7 to 12 in.	71	56	69	54

Pipe, Vitrified Sewer—
Carload lots.
Standard Pipe and Fittings, 3 to 24 in., f.o.b. factory:
First-class 87%
Second-class 90%

Pipe, Stove—

	Per 100 joints. C. L.	L. C. L.
Edwards' Nested:		
5 in., Standard Blue	$6.25	$7.25
6 in., Standard Blue	6.75	7.75
7 in., Standard Blue	7.75	8.75
5 in., Royal Blue	7.00	8.00
6 in., Royal Blue	7.50	8.50
7 in., Royal Blue	8.50	9.50
Wheeling Corrugating Co.'s Nested:		
5 in., Uniform Color	$5.90	$6.90
6 in., Uniform Color	6.40	7.40
7 in., Uniform Color	7.40	8.40

Planes and Plane Irons—
Wood Planes—
Bench, first qual. ..... 30@30&10%
Bench, second qual. ..... 40@40&10%
Molding ..... 25@25&10%
Chapin-Stephens Co.:
Bench, First Quality 30%
Bench, Second Quality 40%
Molding and Miscellaneous 25%
Toy and German 30%
Union 60%

Iron Planes
Chaplin's Iron Planes 60%
Union 60%

Plane Irons—
Wood Bench Plane Irons, list Dec. 12, '06 ..... 25%
Buck Bros. 30%
Chapin-Stephens Co. 25%
Union 50%
L. & I. J. White ..... 20&5@25%

Planters, Corn, Hand—
Kohler's Eclipse ..... ℔ doz. $7.50

Plates—
Felloe ..... lb. 3¾@4¢
Avery Stamping Co.:
Standard Wrot. Steel Felloe Plates in 100 lb kegs, per 100 lb, ¾-in. to 1⅛-in., $4.00 net; 1¼-in. to 2-in., inclusive, $3.75 net.

Steel Pipe Hook—
Never-Break ..... 75&10%

Pliers and Nippers
Button Pliers .... 75&5@75&10&5%
Gas Burners, per doz., 5 in., $1.25 @$1.30; 6 in., $1.45, $1.50.

Gas pipe.. 7	8	10	12-in.
	$2.00	$2.25	$2.75	$3.50

Acme Nippers ..... 50&5%
Cronk & Carrier Mfg. Co.:
American Button 60%
Improved Button ..... 75&10%
Cronk's 60%
No. 80 Linemen's 50%
Stub's Pattern 45%
Combination and others 33⅓%
Elmore Gas Pliers 70%
Heller's Farriers' Nippers, Pincers and Tools ..... 40&5@40&10&5%
P., S. & W. Tinners' Cutting Nippers 40%
Swedish Side, End and Diagonal Cutting Pliers 50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds 40%

Plumbs and Levels—
Chapin-Stephens Co.:
Plumbs and Levels ..... 30@30&10%
Chaplin's Imp. Brass Cor. 40@40&10%
Pocket Levels ..... 30@30&10%
Extension Sights ..... 30@30&10%
Machinists' Levels ..... 40@40&10%
Disston's Plumbs and Levels .... 60&10%
Disston's Pocket Levels ..... 60&10%
Stanley's Dulex 35%
Woods' Extension 33⅓%

Points, Glaziers'—
Bulk and 1-lb. papers .... lb. 9 ¢
½-lb. papers ..... lb. 9½¢
¼-lb. papers ..... lb. 10 ¢

Police Goods—
Manufacturers' Lists .. 25@25&5%
Tower's 25%

Polish—Metal, Etc—
Ladd Co.:
Putzade Liquid, ℔ gro., ½ pts., $12.00; 1 pts., $20.00; 1 qts., $40.00; ℔ doz., ½ gals., $6.35; 1 gals., $12.00.
Prestoline Liquid, No. 1 (½ pt.), ℔ doz., $3.00; No. 2 (1 qu.), $9.00 .. 40%
Prestoline Paste 40%
George William Hoffman:
U. S. Metal Polish Paste, 3 oz. boxes, ℔ doz. 50¢; ℔ gro. $4.50; ½ lb boxes, ℔ doz. $1.25; 1 lb boxes, ℔ doz. $2.25.
U. S. Liquid, 8 oz. cans, ℔ doz., $1.25.
Barkeepers' Friend Metal Polish, ℔ doz., $1.75.

Stove—
Black Eagle Benzine Paste, 5 lb cans, ℔ lb 10¢
Black Eagle, Liquid, ½ pt. cans.. ℔ doz. 75¢
Black Jack Paste, ¾ lb cans, ℔ gr. $9.00
Black Kid Paste, 5 lb can...each, $0.65
Ladd's Black Beauty Liquid, per 100 tins $6.75
Joseph Dixon, ℔ gr. $5.75 ..... 10%
Dixon's Plumbago ..... ℔ lb 8¢
Fireside ..... ℔ gr. $2.50
Gem, ℔ gr. $1.50 ..... 10%
Japanese ..... ℔ gr. $3.50
Jet Black ..... ℔ gr. $3.50
Peerless Iron Enamel, 10 oz. cans.. ℔ doz. $1.50

Window Polish—
Benj. P. Forbes:
Glasbright, No. 2, gal pails, ℔ doz., $24.00; each, $2.50; 1 lb cans, each ..... 75¢
Glasbright Powder, bbls., ℔ lb..20¢

Poppers, Corn—
1 qt. Square..doz.$0.80; gro.$8.75
1 qt. Round..doz.$0.90; gro.$10.00
1½ qt. Square.doz.$1.20; gro.$12.00
2 qt. Square..doz.$1.50; gro.$15.00

Post Hole and Tree Augers and Diggers—
See also *Diggers, Post Hole, &c.*

Posts, Steel—
Steel Fence Posts, each, 6 ft., 46¢; 6½ ft., 48¢; 7 ft., 50¢.
Steel Hitching Posts ..... each $1.30

Potato Parers—
See *Parers, Potato.*

Pots, Glue—
Enameled 40%
Tinned ..... 50&10%

Powder—
Black Sporting:
Kegs (25 lb.)..$5.00@5.50
Half Kegs (12½ lb.), $2.75@3.00
Quarter Kegs (6¼ lb.), $1.50@1.65
Canisters, pounds... .25
Canisters, ½ pounds. .15
Canisters, ¼ pounds. .12
Discount to the trade, 10%.
NOTE.—Prices vary according to territory.
King's Semi-Smokeless:
Keg (25 lb bulk) $6.50
Half Keg (12½ lb bulk) $3.50
Quarter Keg (6¼ lb bulk) $1.90
Case 24 (1 lb cans bulk) $8.50
Half case (1 lb cans bulk) $4.50
King's Smokeless: Shot Gun, Rifle.
Keg (25 lb bulk) $12.00 $15.00
Half Keg (12½ lb bulk) .. 6.25 7.75
Quarter Keg (6¼ lb bulk) 3.25 4.00
Case 24 (1 lb cans bulk) 14.00 17.00
Half case 12 (1 lb c. bk) .. 7.25 8.75

Presses—
Fruit, Wine and Jelly—
Enterprise Mfg. Co. ..... 20@25%

Seal Presses—
Morrill's No. 1, ℔ doz., $20.00 ..... 50%

Pruning Hooks and Shears
See *Shears.*

Pullers, Nail, Etc.—
Cyclops 50%
Elmore Drop Forged Tack Pullers..10%
Miller's Falls, No. 3, ℔ doz., $12.00.. 33⅓&10%
Morrill's No. 1, Nail Puller, ℔ doz. $20.00 ..... 50%
Pearson No. 1, Cyclone Spike Puller, each $30.00 ..... 50%
The Scranton Co. Case Lots:
No. 2B (large) $5.50
No. 3B (small) $5.00
Smith & Hemenway Co.:
Diamond B 70%
Giant 50%
Staple Pullers, Utica and Davison 60%
Taylor Mfg. Co., Sampson Tack, ℔ doz. $0.40

Pulleys, Single Wheel—

Inch	1½	1¾	2	3
Awning or Tackle, doz.	$0.50	.55	.60	1.05

Hay Fork, Swivel or Solid Eye, doz., ¼ in., $1.25; 5 in., $1.55

Inch	2	2¼	2½
Hot House, doz...	$0.65	.85	1.20
Inch	1¼	1½	1¾	2
Screw, doz...	$0.16	.19	.24	.30
Inch	1¾	2	2¼	2½
Side, doz.....	$0.25	.40	.55	.60
Inch	1½	1¾	2	2½

Sash Pulleys—
Common Frame; Square or Round End, per doz., 1¾ and 2 in. ..... 17@20¢
Auger Mortise, no Face Plate, per doz., 1¾ and 2 in.... 20@21¢
Acme, No. 35..1¾ in., 19¢; 2 in., 20½¢
American Pulley Co.:
Wrought Steel American Plain Axle ..... 50&10%
Wrought Steel, Eagle ..... 17@20¢
Top Notch, Electrically Welded, Nos. 3 and 4 ..... 19¢
Common Sense ..... ℔ doz. 20¢
Fox-All-Steel, Nos. 3 and 7, 2 in.... ℔ doz. 50%
Grand Rapids All Steel Noiseless..50%
Niagara, No. 25, 1¾ in., 19¢; 2 in., ... 20½¢
No. 26 Troy..1¾ in., 14½¢; 2 in., 16½¢
Star, No. 26....1¾ in., 19¢; 2 in., 20½¢
Tackle Blocks—See Blocks.

Pumps—
Cistern 60%
Pitcher Spout ..... 75&10&5@80
Wood Pumps, Tubing, &c. 50%
Barnes Dbl. Acting (low list) 50%
Barnes Pitcher Spout 80%
Contractors' Rubber Diaphragm, No. 2, B. & L. Block Co. $16.00
Daisy Spray Pump ..... ℔ doz. $6.50
Flint & Walling's Fast Mail Hand (low list) ..... 50&5%
Flint & Walling's Fast Mail (low list) ..... 50&5%
Flint & Walling's Tight Top Pitcher 80%
National Specialty Mfg. Co., Measuring, Nos. 2, $6.90; 3, $5.50 ..... 30%
Myers' Pumps (low list) ..... } 50
Myers' Power Pumps ..... }
Myers' Spray Pumps ..... }

Pump Leathers—
Plunger and Valve Leathers—Per gro.:

No..... 1	2	3	4
$5.00	6.00	7.00	8.00

Cup Leathers—Per 100:

Inch.... 2½	3	3½	4
$5.00	7.00	9.00	12.00

30@30&10%

Punches—
Saddlers' or Drive, good, doz. .50@75¢
Spring, single tube, good quality $1.75
Revolving (4 tubes)....doz.$3.50
Bemis & Call Co.'s Cast St'l Drive..50%
Elmore Tool Mfg. Co.:
Machinists' Center 40%
Tinners'; Solid, 50%; Prick 50%
Morrill's Nos. 1AA, 1A, 1B, 1C, 1D, $15.00 ..... 30%
Hercules, 1 die, each $5.00 ..... 50%
Niagara Hollow Punches 40%
Niagara Solid Punches ..... 55&10%
Tinners' Hollow, P., S. & W. Co..40%
Tinners' Solid, P., S. & W. Co., ℔ doz., $1.44 ..... 40&10%

Rail—Barn Door, &c.—
Sliding Door, Painted Iron, 2½@2¾¢
Sliding Door, Wrought Brass, 1¼ in., lb., 36¢ 50%
Cronk's:
Double Braced Steel Rail..℔ ft. 2¾¢
O. N. T. Rail ..... 2¾¢
Griffin's:
xxx, ℔ 100 ft., 1 x 3-16 in., $3.25; 1¼ x 3-16 in., $3.75.
Hinged Hanger, ℔ 100 ft., 1 x 3-16 in., $3.50; 1¼ x 3-16 in., $4.00.
Lane's:
Hinged Track, ℔ 100 ft. $3.45
O. N. T., ℔ 100 ft., 1 in., $3.12½; 1¼ in., $3.45; 1½ in., $4.00.
Standard, 1¼ in. ..... ℔ 100 ft. $4.00
Lawrence Bros.:
1 x 3-16 in., ℔ 100 ft., $7.50; 1¼ x 3-16 in., $8.75 ..... 55&7½%
Trolley, No. 301, ℔ ft. ..... 9¢
McKinney's:
Hinged Hanger Track, ℔ ft., 11¢. 60&5%
1 x 3-16 Track ..... 55&7½%
Myers' Stayon Track ..... 60&5%
Richards Mfg. Co.:
Common, 1 x 3-16 in., $3.00; 1¼ x 3-16, $3.25; 1¼ x 3-16, $3.50.
Special Hinged Hanger Rail..60&10%
Lag Screw Rail, No. 65 ..... 50%
Gauge Trolley Track, ℔ ft., No. 31, 9¢; No. 32, 14¢; No. 33, 20¢.
No. 50 ..... 60&10%
Nos. 61, $3.00; 62, $3.25; 63, $3.50; 64, $4.00; 45, $3.25; 46, $3.50; 49, No. 1, $3.25; 49, No. 2, $3.50.

Rakes—
NOTE.—Many goods are sold at net prices.
American Fork & Hoe Co.:
Lawn, ℔ doz., No. 24, $2.50; No. 20 ..... $2.25
Cronk's:
Steel Garden: Champion, ℔ doz., 12-tooth, $3.75; 14-tooth, $4.00; 16-tooth, $4.25; Ideal, ℔ doz., 12-tooth, $3.00; 14-tooth, $3.30; 16-tooth, $3.60.
Victor, 12-tooth, $2.25; 14-tooth, $2.50; 16-tooth, $2.75.
Queen City Lawn, ℔ doz., 20 teeth, $2.85; 24, $3.00 ..... net
Anticlog Lawn, ℔ doz. $4.00
Malleable Garden ..... 70&10%
Ideal Steel Garden, ℔ doz., 12 teeth, $15.00; 14, $16.00; 16, $18.00 ..... 80%
Kohler's:
Jumbo Lawn, 36-tooth ..... ℔ doz. $5.00
Lawn Queen, 20-tooth ..... ℔ doz. $2.85
Lawn Queen, 24-tooth ..... ℔ doz. $3.00
Paragon, 20-tooth ..... ℔ doz. $2.65
Paragon, 24-tooth ..... ℔ doz. $2.75
Steel Garden, 14-tooth ..... ℔ doz. $2.40
Malleable Garden, 14-tooth, ℔ doz. $1.75@2.00

Rasps, Horse—
Disston's 75%
Heller Bros.' ..... 70&5@70&10&5%
Liveright Bros.' Gold Medal..70&10@75%
McCaffrey's American Standard ..... 60&10&5%
New Nicholson ..... 70&10@75%
See also Files.

Razors—
John Engstrom Swedish 65%
Sharp Shaver 60%
Fox Razors, ℔ doz., No. 42, $24.00; No. 44, $20.00; No. 82, Platina, $36.00. } Dis. 50%

Reels, Fishing—
Hendryx:
M 6, Q 6, A 6, B 6, M 9¾, M 16, Q 16, A 16, B 16, 4008, Rubber, Populo, Nickeled Populo 20%
Aluminum, German Silv., Bronze..25%
1240 N, 124 N 20%
3004 N, 06 N, 6 RM, G 9 ..... 25%
4 N, 6 PN, 24 N, 26 PN 20%
2904 P., 33⅓%; 2904 PN., 33⅓%; 0924 N., 33⅓%; 92084 N., 33⅓%; 002904 PN., 33⅓%; 802 N., 33⅓%; 986 PN, 2904 N, 974 PN 25%
5009 PN 5009 N 20%
Competitor 102 P, 102 PN, 202 P, 202 PN 102 PR, 202 PR 20%
304 P, 304 PN, 00304 P, 00304 PN 33⅓%

Registers—*List July 1, 1903.*
Japanned, Electroplated and Bronzed 70%
White Porcelain Enamel..50&10%
Solid Brass or Bronze Metal.40%

Revolvers—
Single Action ..... $5¢@$1.00
Double Action, except 44 cal.$2.00
Double Action, 44 caliber...$2.00
Automatic $4.00
Hammerless $4.50

Riddles, Hardware Grade
16 in.....per doz.$2.50@$2.75
17 in.....per doz.$2.75@$3.00
18 in.....per doz.$3.00@$3.25

Rings and Ringers—
Bull Rings—

	2	2½	3 inch.
Steel	$0.70	0.75	0.80 doz.
Copper	$1.10	1.25	1.65 doz.

Hog Rings and Ringers—
Hill's Rings, per gro. boxes, $4.60@$4.75; per doz. boxes, 40@45¢
Hill's Ringers, Gray Iron, doz., 55@65¢
Hill's Ringers, Malleable Iron, doz.85@95¢
Blair's Rings..per gro.$5.50@$6.00
Blair's Ringers..per doz.65@70¢

Rivets—
Copper Rivets and Burrs....50%
Tinners' and Miscellaneous Rivets ..... 80@80&10%

Bifurcated and Tubular—
Assorted in Boxes.
Bifurcated, per doz. boxes, pasteboard boxes, 50 count, 23@25¢; Tin boxes, 100 count, 29@32¢.
Tubular, per doz. boxes, 50 count, 29@32¢; 100 count, 51@58¢.

Rollers—
Cronk's Stay, No. 50 ..... $1.00
Cronk's Brinkerhoff No. 55, $0.60; No. 56, $0.75; No. 60 ..... $0.75
Lane's Stay 40%
Richards' Stay:
Handy Adj. and Reversible No. 53.75¢
O. K. Adj. and Reversible No. 58.50¢
Lag Screw, Nos. 55 and 57 ..... 50%
Underwriters', Nos. 59, 60 ..... 50%
Favorite, No. 54 ..... 60%

Rope—
Manila, 7-16 in. diam. and larger: Pure ..... lb. 9¢
Sisal, 7-16 in. diam. and larger: Pure ..... lb. 7¢
Sisal, Hay, Hide and Bale Ropes, Medium and Coarse: Pure ..... lb. 7½@7¾¢
Sisal, Tarred, Medium Lath Yarn: Pure ..... lb. 6½@6¾¢
Cotton Rope: Best, ¼-in. and larger. 16½@18¢
Medium, ¼-in. and larger.15@16¢
Common, ¼-in. and larger..7½¢
In coils, ½¢ advance.
Jute Rope: Thread, No. 1, ¼-in. and up, lb. ..... 5½¢
Thread, No. 2, ¼-in. and up, lb. ..... 5¢

Wire Rope—
Galvanized ..... 37½&2½%
Plain ..... 45&2½%

Ropes, Hammock—
Covert Mfg. Co.:
Jute, 35%; Sisal 20%

Rules
Boxwood ..... 60@60&10%
Ivory ..... 35&10@35&10&5%
Chapin-Stephens Co.:
Boxwood 60%
Flexifold 40%
Ivory ..... 25@25&10%
Miscellaneous ..... 50@50&10%
Stephens' Combination 55%
Stationers' ..... 50@50&10%
Keuffel & Esser Co.:
Folding, Wood ..... 35&10%
Folding, Steel ..... 33⅓&10%
Lufkin's Steel ..... 50&10%
Lufkin's Lumber ..... 50&10%
Upson Nut Co.:
Boxwood ..... 60@60&10%
Ivory ..... 35&10@35&10&10%

Sash Balances—
See *Balance, Sash.*

Sash Locks—See *Locks, Sash.*

Sash Weights—
See *Weights, Sash.*

Sausage Stuffers or Fillers
See *Stuffers or Fillers, Sausage.*

Saw Frames—
See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—
Atkins':
Circular 45%
Band ..... 50@50&10%
Butcher Saws 50%
Cross Cuts 35%
One-Man Cross Cut 40%
Narrow Cross Cut 50%
Hand, Rip and Panel ..... 35&5%
Miter Box and Compass 40%
Mulay, Mill and Drag 45%
Wood Saws ..... 40&10%
Chapin-Stephens Co.:
Turning Saws and Frames ..... 30@30&10%
Diamond Saw & Stamping Works:
Sterling Kitchen Saws ..... 30&10&10%
Disston's:
Circular, Solid and Ins'ted Tooth 50%
Band, 2 to 18 in. wide 60%
Band, ¾ to 1¾ 60%
Crosscuts 45%
Narrow Crosscuts 50%
Mulay, Mill and Drag 50%
Framed Woodsaws 25%
Woodsaw Blades 25%
Woodsaw Rods, Tinned 15%
Hand Saws, Nos. 12, 99, 9, 16, d100, D8, 120, 76, 77, 8 ..... 25%
Hand Saws, Nos. 7, 107, 107½, 3, 1, 0, 00, Combination 30%
Compass, Key Hole, &c. 25%
Butcher Saws and Blades 30%
C. E. Jennings & Co.'s:
Back Saws 16⅔%
Butcher Saws ..... 25&7½%
Compass and Key Hole Saws ..... 33⅓&7½%
Framed Wood Saws ..... 25&7½%
Hand Saws 12½%
Wood Saw Blades ..... 33⅓&7½%
Millers Falls:
Butcher Saws ..... 15&10%
Star Saw Blades ..... 15&10%
Massachusetts Saw Works:
Victor Kitchen Saws ..... 40&10&50%
Butcher Saws Blades ..... 35@40%
Peace & Richardson's Hand Saws 30%
Simonds':
Circular Saws 45%
Crescent Ground Cross Cut Saws 30%
One-Man Cross Cuts ..... 40&10%
Gang Mill, Mulay and Drag Saws 45%
Band Saws 50%
Back Saws ..... 25@25&7½%
Butcher Saws ..... 35@35&7½%
Hand Saws ..... 25@25&7½%
Hand Saws, Bay State Brand 45%
Compass, Key Hole, &c. ..... 25@25&7½%
Wood Saws ..... 40&7½%
Wheeler, Madden & Clemson Mfg. Co.'s Cross Cut Saws 50%

Hack Saw Blades and Frames—
Atkins' Hack Saw Blades A A A A 25%
Disston's:
Concave Blades 25%
Keystone Blades 35%
Hack Saw Frames 30%
Simonds, 25%; The Best, 35%; Culley 35%
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180 ..... 40&7½%
Hack Saws, Nos. 175, 180, complete ..... 40&7½%
Goodell's Hack Saw Blades ..... 40&10%
Griffin's Hack Saw Frames ..... 35&5&10%
Griffin's Hack Saw Blades ..... 35&5&10%
Star Hack Saws and Blades ..... 15&10%
Sterling Hack Saw Blades ..... 30&10&5%
Sterling Hack Saw Frames ..... 30&10&10%
Sterling Power Hack Saw Machines, each, No. 1, $25.00; No. 2, $30.00 ..... 10%
Victor Hack Saw Blades 20%
Victor Hack Saw Frames 40%
Whitaker Mfg. Co.:
National Hand Blades, Hand Frames, Power Blades 40%

Scroll—
Barnes, No. 7, $15 ..... 25%
Barnes' Scroll Saw Blades 40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $15; with boring attachment, $20 ..... 20%
Lester, complete, $10.00 ..... 15&10%
Rogers, complete, $3.50 and $4.00 ..... 15&10%

Scales—
Union Platform, Plain ..... $2.10@2.20
Union Platform, Stpd ..... $2.20@2.30
Chatillon's:
Eureka 25%
Favorite 40%
Grocers' Trip Scales 50%
The Standard Portables 40%
The Standard R. R. and Wagon ..... 50&10%

Scrapers—
Box, 1 Handle ..... doz. $1.85@2.10
Box, 2 Handle ..... doz. $2.35@2.50
Ship ... Light, $2.00; Heavy, $1.50
Chapin-Stephens Co., Box ..... 30@30&10%
Richards Mfg. Co., Foot 60%

Screws—Bench and Hand
Bench, Iron, doz., 1 in., $2.50@2.75; 1⅛, $3.00@3.25; 1¼, $3.50@3.75
Bench, Wood ..... 20@20&10%
Hand, Wood ... 70&10@70&10&10%
Chapin-Stephens Co., Hand ..... 70@70&10&2½%

Coach, Lag and Hand Rail—
Lag, Cone Point ..... 80&5%
Coach, Gimlet Point 80%
Hand Rail ..... 70&10@75%

Jack Screws—
Standard List ..... 70&10@75%
Millers Falls ..... 50&10&10%
Swett Iron Works ..... 70@75%

Machine—
Cut Tread, Iron, Brass or Bronze:
Flat Head or Round Head, 50@50&10%
Fillister Head ..... 40@40&10%
Rolled Thread, F. H. or R. H., Iron ..... 75&10%
F. H. or R. H., Brass, Nos. 8 to 14 ..... 65&10%

Set and Cap—
Set (Iron) ..... 75&10&7½%
Set (Steel), net advance over Iron 25%
Sq. Hd. Cap ..... 70&10&7½%
Hex. Hd. Cap ..... 70&10&7½%
Rd. Hd. Cap ..... 50&7½%
Fillister Hd. Cap ..... 60&7½%

Wood—
List July 23, 1903.
Flat Head, Iron ..... 87½&5@.. %
Round Head, Iron ..... 85&5@.. %
Flat Head, Brass ..... 80&5@.. %
Round Head, Brass ..... 77½&5@.. %
Flat Head, Bronze ..... 75&5@.. %
Round Head, Bronze ..... 72½&5@.. %
Drive Screws ..... 87½&5@.. %

Scroll Saws—
See *Saws, Scroll.*

Scythes— *Per doz.*
Plain Grass, Cutting Edge Polished ..... $6.25@$6.50
Clipper, Bronzed Web ..... $6.50@$6.75
Solid Steel, Web and Backs Polished ..... $7.00@$7.25
Bush, Weed and Bramble, Painted ..... $6.50@$6.75
Grain, Painted, Cutting Edge Polished ..... $8.25@$8.50
Clipper Grain, Bronze Web, $8.50@$8.75

Seeders, Raisin—
Enterprise ..... 25@30%

Sets— Awl and Tool—
Fray's Tool Handles, Nos. 1, $12; 2, $16; 3, $12 ..... 50%
Millers Falls Adj. Tool Handles, No. 1, $12; No. 4, $12; No. 5, $18 ..... 20&10%

Garden Tool Sets—
American Fork & Hoe Co.:
Rake, Shovel and Hoe, ₱ doz. sets, No. 3 P F $7.25

Sets, Nail—
Octagon ..... gro. $3.50@3.75
Buck Bros. 27½%
Elmore Tool Mfg. Co. 30%
Mayhew's ..... ₱ gro. $9.00
Snell's Corrugated, Cup Pt. ..... 40&10%
Snell's Knurled, Cup Pt. ..... 40&10%
Victor Knurled, Cup Pt. ... ₱ gro. $7.50

Rivet—
Regular list ..... 75@75&10%

Saw—
Atkin's:
Criterion 40%
Adjustable 40%
Disston's Star, Monarch and Triumph 30%
Morrill's No. 1 ..... $15.00
Nos. 3 and 4, Cross Cut $20.60
No. 5, Mill $30.00
Nos. 10, 11, 95 ..... $15.60
No. 1 Old Style $10.00
Special $16.25
Giant Royal Cross Cut ..... ₱ doz. $7.50
Royal, Hand ..... ₱ doz. $4.50
Taintor Positive ..... ₱ doz. $6.75

Shaving—
Fox Shaving Sets, No. 30 ..... ₱ doz., net, $24.00
Smith & Hemenway Co.'s 75%

Sharpeners, Knife—
Pike Mfg. Co.:
Fast Cut Pocket Knife Hones, ₱ doz. $1.50
Mounted Kitchen Sand Stone, ₱ doz. $1.50
Natural Grit Carving Knife Hones, ₱ doz. $3.00
Quick Cut Emery Carving Knife Hones, ₱ doz. $1.50
Quick Edge Pocket Knife Hones, ₱ doz. $2.50
} 50%

Skate—
Smith & Hemenway Co., Eureka 50%

Shaves, Spoke—
Iron ..... doz. $1.25
Wood ..... doz. $2.00
Bailey's (Stanley R. & L. Co.) 45%
Chapin-Stephens Co. ..... 30@30&10%
Goodell's, ₱ doz. $9.00 ..... 15&10%

Shears—
Cast Iron	7	8	9 in.
Best	*$16.00*	*18.00*	*20.00 gro.*
Good	*$13.00*	*15.00*	*17.00 gro.*
Cheap	*$5.00*	*6.00*	*7.00 gro.*

Straight Trimmers, &c.:
Best quality Jap ..... 70&10&5%
Best Quality Nickel ... 60&10&5%
Tailors' Shears ..... 40@40&10%
Acme Cast Shears ..... 40@40&5%
Heinisch's Tailor's Shears 10%
National Cutlery Co.'s Nickel Plated, 60&10%; Japan Handles ..... 70&10%
Columbian Cutlery Co.:
Sheep, 1900 list ..... 30&10&5%
Grass ..... 50&10%
Horse or Mule ..... 50&10%
J. Wiss & Sons Co.:
Best Quality Jap'd ..... 60&10%
Best Quality Nickeled ..... 50&10%
Tailors' 25%

Tinners' Snips—
Steel Blades ..... 20&5@20&10%
Steel Laid Blades ..... 50&10%
Acme Cast Snips ..... 40@45&5%
Forged Handles, Steel Blades, Berlin 50%
Heinisch's Snips 40%
Jennings & Griffin Mfg. Co.'s 6½ to 10 in. ..... 33⅓&7½%
National Cutlery Co.'s Forged Steel 5%
Niagara Snips 40%
P. S. & W. Forged Handles, 25; W. R. W. 50%
J. Wiss & Sons Co.:
Wiss Forged Steel 25%

Pruning Shears—
Cronk's Hand Shears 33⅓%
Cronk's Wood Handle Shears 33⅓%
Disston's Combined Pruning Hook and Saw, ₱ doz, $18.00 ..... 25%
Disston's Pruning Hook only, ₱ doz., $12.00 ..... 25%
J. T. Henry Mfg. Co.:
Pruning Shears, all grades 40%
P. S. & W. Co. ..... 40&10%
Columbian Cutlery Co.:
Hedge, Wilcut Brand ..... 60&10%
Lawn and Border, Wilcut Brand, 60&10%

Sheaves—Sliding Door—
Reading 40%
R. & E. list 15%

Sliding Shutter—
Reading list 40%
R. & E. list 15%

Shells—Shells, Empty—
Brass Shells, Empty:
Climax, 10 and 12 gauge ..... 60&5%
Club, Rival, 65&5%; First Quality, 60&5%
Paper Shells, Empty:
New Rapid, 10, 12, 16 and 20 gauge, 25&10%
Climax, 10 and 12 gauge; Acme and Magic, 10, 12, 16 and 20 gauge; Ideal, 10, 12, 16 and 20 gauge; Leader grade ..... 25&5%
Union, League, 10 and 12 gauge, Rival Grade 25%
New Climax, Defiance, 10, 12, 14, 16 and 20 gauge; Climax, 14, 16 and 20 gauge 20%
Challenge, Monarch, 10, 12, 16 and 20 gauge; League, Union, 14, 16 and 20 gauge; Repeater Grade 20%

Shells, Loaded—
Loaded with Black Powder 40%
Loaded with Smokeless Powder, medium grade ..... 40&5%
Loaded with Smokeless Powder, high grade ..... 40&10&10%
Union Metallic Cartridge Co.:
New Club, Black Powders 40%
Nitro Club, Smokeless Powders ..... 40&5%
Arrow, Smokeless Powders ..... 40&10&10%
Winchester:
Smokeless Repeater Grade ..... 40&5%
Smokeless Leader Grade ..... 40&10&10%
Black Powder 40%

Shingles, Metal— Per Sq.
Edwards Mfg. Co.:	Painted.	Galv.
14 x 20	$4.25	$6.00
10 x 14	4.50	6.25
7 x 10	4.75	6.50

Wheeling Corrugating Co.:

Dixie, 14 x 20 in.	$4.05	$5.05
Dixie, 10 x 14 in.	4.25	5.45
Dixie, 7 x 10 in.	5.25	6.70

Shoes, Horse, Mule, &c.—
F.o.b. Pittsburgh:
Iron ..... per keg. $4.10
Steel ..... per keg. $3.85
Burden's, all sizes ..... ₱ keg $3.90

Shot—
25-lb. bag.
Drop, up to B $1.80
Drop, B and larger 2.05
Buck 2.05
Chilled 2.05
Dust 2.30

Shovels and Spades—
Association List ..... 40&7½%@40&10%
Avery Stamping Co. 40%

Snow Shovels—
Long Handle ..... $2.50@$2.75
Wood and Mall, D Handle, $2.65@$2.90

Sieves and Sifters—
Hunter's Imitation, gro. ... $9.50
Hunter's Genuine, per gro. .. $12.00

Sifters, Ash—
Acme Ball Bearing Sales Co., Acme Automatic Ash Sifter, each, $3.25; ₱ doz. $39.00

Sieves, Seamless Metallic
—Per dozen.—

Mesh	*14*	*16*	*18*	*20*
Iron Wire	*$1.05*	*1.05*	*1.10*	*1.20*
Tinned Wire	*$1.15*	*1.15*	*1.20*	*1.30*

Sieves, Wooden Rim—
Nested, 10, 11 and 12 Inch.
Mesh 18, Nested ... doz. $0.90@0.95
Mesh 20, Nested ... doz. $1.00@1.05
Mesh 24, Nested ... doz. $1.30@1.40

Sinks, Cast Iron—
Painted, Standard list:
12 x 12 to 22 x 36 in. 60%
20 x 24 to 24 x 50 in. 50%
24 x 60 to 24 x 120 in. 30%
Barnes' low list 60%
NOTE.—There is not entire uniformity in lists used by jobbers.

Skeins, Wagon—
Cast Iron ..... 70@75&10%
Steel ..... 40@45%

Slates, School—
Factory Shipments.
"D" Slates ..... 30@30&10%
Eureka, Unexcelled Noiseless .. 60&7 tens.
Victor A, Noiseless .60&4 tens 45%

Slaw Cutters—See *Cutters.*

Snaps, Harness—
German ..... 40@40&10%
Covert Mfg. Co.:
Derby, 25%; Yankee, 30&2%; Yankee Roller, 30&2%
High Grade, 40%; Trojan 40%
Jockey 25%

Snaths—
Grass Scythe ..... 50@50&5%

Snips, Tinners—See *Shears.*

Spoons and Forks—
Silver Plated—
Good Quality ..... 50&10@60&5%
Cheap ..... 60@60&10%
International Silver Co:
1847 Rogers Bros. ..... 40&10%
Rogers & Bro., William Rogers Eagle Brand ..... 50&10%
Anchor, Rogers Brand 60%
Wm. Rogers & Son ..... 60&10%

Miscellaneous
German Silver ..... 60@60&5%

Tinned Iron—
Teas ..... per gro. 50@55¢
Tables ..... per gro. $0.90@$1.00
Atlas Mfg. Co.:
Tea Spoons, ₱ gro. ..... 50¢@55¢
Table Spoons, ₱ gro. ..... $0.90@$1.00

Springs— Door—
Bardsley's Spring and Check 40%
Chicago (Coil) ..... 40&10%
Gem (Coil) 20%
Pullman Door and Gate 10%
Reliance (Coil) ..... 40&10%
Star (Coil) 35%
Torrey's Rod, 39 in. ..... ₱ doz. $1.00

Carriage, Wagon, &c.—
1¼ in. and Wider:	*Per 100 lb.*
Black	*$4.75@$5.00*
Half Bright	*$4.75@$5.00*
Bright	*$5.25@$5.50*

Painted Seat Springs:
1½ x 2 x 26 ... per pair. 45@47¢
1½ x 3 x 28 ... per pair. 68@71¢

Sprinklers, Lawn—
American Foundry & Mfg. Co.:
Cactus, 65%; Japanese, 70%; National, ₱ doz. $12.00
Enterprise ..... 25@30%
Philadelphia No. 1, ₱ doz, $12; No. 2, $15; No. 3, $20 ..... 30%

Squares—
Nickel plated .. } *List Jan. 5, 1900.*
Steel and Iron .. } *80@80&10%*
Rosewood Hdl. Try Square and T-Bevels ..... 60&10&10@70%
Iron Hdl. Try Squares and T-Bevels ..... 40&10@40&10&10%
Disston's Try Squares and Bevels, Rosewood Handle, 60 & 10%; Iron Stock and Bevel 15%

Squeezers, Lemon
Wood, Porcelain Lined:
Cheap ..... doz. $1.00
Good Grade ..... doz. $1.25
Tinned Iron ..... doz. $0.75@1.00
Iron, Porcelain Lined ... doz. $1.75
Victor, ₱ gro. $9.00

Staples—
Barbed Blind ..... 85&5@85&10%
Electricians' ..... 80&10&10@85%
Fence Staples, Polished, $2.05; Galvanized $2.35
Poultry Netting Staples ..... per lb. 3¼@3½¢

Steels, Butchers'—
Dick's 30%
Foster Bros. 30%

Steelyards— .... 30@30&10%

Stocks and Dies—
Blacksmiths' ..... 50@50&10%
Curtis Rev'ble Ratchet Die Stock 25%
Derby Screw Plates 25%
Green River 25%
Lightning Screw Plate 25%
Little Giant 25%
Reece's New Screw Plate 25%

Stoners, Cherry—
Enterprise ..... 25@30%

Stones, Axe—
Pike Mfg. Co., Axe Stones (all kinds) 33⅓%

Glass Cutters' Stones—
Pike Mfg. Co., Glass Cutters' Stones and Supplies 40%

Stones, Oil, &c.—
Pike Mfg. Co., 1907 list: ₱ lb.
Arkansas St. No. 1, 3 to 5½ in. $2.80
Arkansas St. No. 1, 5½ to 8 in. $3.50
Arkansas Slips No. 1 ..... $1.00
Lily White Washita, 4 to 8 in. 60¢
Rosy Red Washita, 4 to 8 in. 60¢
Washita St., Extra, 4 to 8 in. 50¢
Washita St., No. 1, 4 to 8 in. 40¢
Washita St., No. 2, 4 to 8 in. 25¢
Lily White Slips ..... 90¢
Rosy Red Slips ..... 90¢
Washita Slips, Extra ..... 80¢
Washita Slips, No. 1 ..... 70¢
Washita Slips, No. 2 ..... 40¢
} 33⅓%

India Oil Stones (entire list) 33⅓%
Quickcut Emery and Corundum Oil Stone, Double Grit 40%
Quickcut Emery and Corundum Axe Stone, Double Grit 33⅓%
Quickcut Emery Rubbing Bricks 40%
Hindostan No. 1, R'g'lar, ₱ lb. 8¢
Hindostan No. 1, Small, ₱ lb. 10¢
Turkey Oil Stones, Extra, 5 to 8 in. ..... ₱ lb. 80¢
Queer Creek Stones, 4 to 8 in. 20¢
Queer Creek Slips ..... 40¢
Sand Stone ..... 6¢
} 33⅓%

Scythe Stones—

Pike Mfg. Co., 1907 list:
Black Diamond S. S. ₱ gro. $12.00
Lamoille S. S. ₱ gro. $11.00
White Mountain S. S. ₱ gro. $9.50
Green Mountain S. S. ₱ gro. $7.00
Extra Indian Pond S.S. ₱ gro. $8.00
No. 1 Indian Pond S.S. ₱ gro. $7.50
No. 2 Indian Pond S.S. ₱ gro. $5.00
Leader Red End S. S. ₱ gro. $5.00
Quick Cut Emery ₱ gro. $10.00
Pure Corundum ₱ gro. $18.00
Crescent $7.00
Emery Scythe Rifles, 2 Coat, $8.80
Emery Scythe Rifles, 3 Coat $11.00
Emery Scythe Rifles, 4 Coat $13.20
Balance of 1907 list 33⅓%
Lectro (Artificial), ₱ gro., $12.00 33⅓%
$12.00
Lightning (Artificial), ₱ gro. $18.00 33⅓%

Stoppers, Bottle—

Victor Bottle Stoppers ₱ gro. $9.00

Stops—Bench—

Millers Falls 15&10%
Morrill's, ₱ doz., No. 1, $10.00 50%
Morrill's, No. 2, $12.50 50%

Door—

Chapin-Stephens Co. 50@50&10%

Plane—

Chapin-Stevens Co. 20%

Straps—Box—

Acme Embossed, case lots. 20&10&10%
Cary's Universal, case lots. 20&10&10%

Stretchers, Carpet—

Cast Iron, Steel Points. . doz. 55¢
All Steel Socket. . . doz. $2.00@2.25
Excelsior Stretcher and Tack Hammer Combined, ₱ doz., $6.00 20%

Stuffers, Sausage—

Enterprise Mfg. Co., Stuffers and Lard Presses 25@25&7½%
National Specialty Co., list Jan. 1, 1902 30&5%
P., S. & W. Co. 40&10&5%

Sweepers, Carpet—

Goshen Sweeper Co.:	Per doz.
Gilt Edge	$27.00
Superfine	26.00
Majestic	24.00
Select, Nickeled	22.00
National Sweeper Co.:	
National Queen, Nickeled	$27.00
Martha Washington, Nickeled	25.00
Monarch, Japanned	20.00
Perpetual, Japanned	18.00
Streator Metal Stamping Co.:	
Model E, Sanitaire	$25.00
Eureka	15.00
Streator Majestic, Nickeled	24.00
Streator Conqueror, Japanned	22.00

NOTE.—Leading Manufacturers give the following rebates from list prices: 50c per dozen on three-dozen lots: $1 per dozen on five-dozen lots; $2 per dozen on ten dozen lots

Tacks, Finishing Nails, &c.

American Carpet Tacks. 90&25@—%
American Cut Tacks. . 90&25@—%
Swedes' Cut Tacks. . 90&30@—%
Swedes' Upholsterers'. 90&35@—%
Gimp Tacks. . . . . 90&35@—%
Lace Tacks. . . . . 90&35@—%
Trimmers' Tacks. . . . . 90&30@—%
Looking Glass Tacks. . . . . 65@—%
Bill Posters' and Railroad Tacks, 90&40@—%
Hungarian Nails. . . . . 80@—%
Finishing Nails. . . . . 70@—%
Trunk and Clout Nails. 75&5@—%

NOTE.—The above prices are for Straight Weights.

Miscellaneous—

Double Pointed Tacks, 90&6 tens@—%

See also Nails, Wire.

Tanks, Oil and Gasoline—

Wilson & Friend Co.:		
Gal.	Gasoline	Oil
50	$2.75	$3.00
60	$3.50	$4.00
110	$5.00	$5.75

Tapes, Measuring—

American Asses' Skin. . . . 56@—%
Patent Leather. . . . . 25@30&5%
Steel . . . . . 33⅓&5%
Chesterman's . . . . . 25@25&5%
Keuffel & Esser Co.:
Favorite, Ass Skin. . . . . 40&10@50%
Favorite, Duck and Leather. . . . . 25&5@25&10%
Metallic and Steel, lower list, 35@35&5%; Pocket, 35@35&5%.
Lufkins:
Asses' Skin. . . . . 40&10@50%
Metallic . . . . . 30@30&5%
Patent Bend, Leather. . . 25&5@25&10%
Pocket . . . . . 40@40&5%
Steel . . . . . 33⅓@35%
Wiebusch & Hilger:
Chesterman's Metallic, No. 34L, etc. 25%
Chesterman's Steel, No. 1038L, etc. 35%

Teeth, Harrow—

Steel Harrow Teeth, plain or headed, ⅝-inch and larger, per 100 lb. . . . . $2.55@$2.80

Thermometers—

Tin Case, Cabinet, Flange, Dairy, &c. . . . . 30@35%

Ties, Bale—Steel Wire—

Single Loop. . . . . 80&4&10%
Monitor, Cross Head, &c. 70&5&2½%

Tinners' Shears, &c.—

See *Shears, Tinners', &c.*

Tinware—

Stamped, Japanned and Pieced, sold very generally at net prices.

Tire Benders, Upsetters, &c.

See *Benders and Upsetters, Tire.*

Tools—Coopers'—

L. & I. J. White. . . . . 20@20&5%

Haying—

Myers' Hay Tools. 50%

Ice Tools—

Gifford-Wood Co. 15%

Miniature—

Smith & Hemenway Co.'s, Davidson, ₱ doz., Nickel Plated, $1.50; Gold Plated. $2.00

Saw—

Atkins' Cross Cut Saw Tools. . . . 35&5%
Simond's Improved. 33⅓%
Simonds' Crescent. 30%

Ship—

L. & I. J. White. 25%

Torches—

Hammers, Engine, ₱ doz. $4.50

Transom Lifters—

See *Lifters, Transom.*

Traps—Fly—

Balloon, Globe or Acme, doz., $1.15@$1.25; gro. . . . $11.50@12.00
Harper, Champion or Paragon, doz., $1.25@1.40; gro. $13.00@13.50

Game—

Imitation Oneida. . . . . 75@10%
Newhouse . . . . . 50&5
Hawley & Norton. . . . . 65&10
Victor . . . . . 75@75&10
Oneida Community Jump. . . . . 70&5
Stop Thief. 60
Tree Trap. 60
Hector . . . . . 75@75&10

Mouse and Rat—

Mouse, Wood, Choker, doz. holes, 12¢
Mouse, Round or Square Wire, doz. 85@90¢
Marty French Rat and Mouse Traps (Genuine), ₱ doz.:

	Crate lots.	Small lots.
No. 1, Rat	$11.50	$14.50
No. 3, Rat	$5.75	$6.50
No. 3½, Rat	$4.70	$5.25
No. 5, Mouse	$2.25	$3.00

Animal Trap Co.:
Out o' Sight, Mouse, ₱ doz. $0.60
Out o' Sight, Rat, ₱ doz. 1.20
Easy Set, Mouse, ₱ doz. 35
Easy Set, Rat, ₱ doz. 85
Out o' Sight Checkers, ₱ doz. holes 12
Out o' Sight, Tin, 5-hole, ₱ doz. traps 75

Trowels—

Disston Brick and Pointing. 25%
Disston Plastering. 20%
Disston "Standard Brand" and Garden Trowels. 30%
Kohler's Steel Garden Trowels, ₱ gro., 5 in., $4.80; 6 in., $6.00
Never-Break, Forged Steel Garden Trowels, in bulk, net ₱ gro. $5.50
In 1 doz. boxes. . . . . ₱ gro. $6.00
Woodrough & McParlin, Plastering. 25%

Trucks, Warehouse, &c.—

B. & L. Block Co.:
New York Pattern. . . . . 50&10%
Western Pattern. . . . . 60&10%
Handy Trucks. . . . . ₱ doz. $16.00
Grocery . . . . . ₱ doz $15.00
McKinney Trucks. . . . . each, net $10.00
Model Stove Trucks. . . . . ₱ doz $18.50

Tubs, Wash—

M'f'gr's list, price per gross.

No.	0	1	2	3
Galvanized	*$67*	*$79*	*$89*	*$99*

10&7½ &5&5%

Twine, Miscellaneous—

Flax Twine:
No. 9, ¼ and ½-lb. Balls. 21@23¢
No. 12, ¼ and ½-lb. Balls. 19@21¢
No. 18, ¼ and ½-lb. Balls. 16@18¢
No. 24, ¼ and ½ -lb. Balls. 15½@17½¢
No. 36, ¼ and ½-lb. Balls. 15@17¢
Chalk Line, Cotton ½-lb. Balls . . . . . 24@29¢
Cotton Mops, 6, 9, 12 and 15 lb. to doz. . . . . 8½@19¢
Cotton Wrapping, 5 Balls to lb., according to quality. . 13½@19¢
American 2-Ply Hemp, ¼ and ½-lb. Balls. . . . . 12½@15¢
American 3-Ply Hemp, 1-lb Balls . . . . . 13½@16¢
India, 2-Ply Hemp, 1½-lb. Balls. Balls (Spring Twine). . 7½@9¢
India 3-Ply Hemp, 1-lb. Balls 7¼@9¢
India 2-Ply Hemp, 1½-lb. Balls. 7@8½¢
2, 3, 4 and 5-Ply Jute, 1½-lb. Balls . . . . . 9@11¢
Mason Line, Linen, ½-lb. Bls. 17¢
No. 26½ Mattress, ¼ and ½ lb. Balls, according to quality. 30@60¢
Wool, 3 to 6 ply. . . . B 6¢; A 7½¢

Vises—

Solid Box. . . . . 60@60&10%

Parallel—

Athol Machine Co.:
Simpson's Adjustable. 40%
Standard 40%
Amateur 25%
Columbian Hdw. Co., Slide . . . . . 40&5%; 65%
Fisher & Norris Double Screw, net, each Nos. 2, $10.50; 3, $16.00; 4, $20.50; 5, $27.00; 6, $32.00.
Fulton Mach. & Vise Co.:
F. & R. Double Swivel Machinists' 40%
Star, Solid Jaw, Machinists' 40%
Hollands':
Machinists' . . . . . 40@40&5%
Keystone . . . . . 65&5@70%
Lewis Tool Co.:
Adjustable Jaw. 30%
Monarch, 50%; Solid Jaw. 50%
Massey Vise Co.:
Clincher 40%
Parallel Bar. 15%
Perfect, 15%; Lightning Grip. 15%
Merrill's 25%
Millers Falls Oval Slide Pattern. 60&10%
Parker's:
Victor, 20@25%; Regulars. . . . 20@25%
Vulcan's . . . . . 40@45
Combination Pipe. . . . . 55@60
Prentiss . . . . . 20@25%
Rock Island. 25%
Snediker's X. L. 33⅓%
Stephens' 33⅓%

Saw Filers

Disston D 3 Clamp and Guide, ₱ doz., $24.00, 30%; Clamps. 30%
Perfection Saw Clamps, ₱ doz. . . . $4.50
Reading 60%

Wood Workers—

Fulton Mach. & Vise Co.:
F. & R. Double Swivel Coachman's 40%
Star Solid Jaw Woodworkers' 60%
Massey Vise Co.:
Lightning Grip, 15%; Perfect. . . . 15%
Wyman & Gordon's Quick Action, 6 in., $6.00; 9 in., $7.00; 14 in., $8.00.

Miscellaneous—

Fulton Machine & Vise Co., Combination Pipe. 70%
Holland's Combination Pipe. . 60@60&5%
Massey's Quick Action Pipe. 40%
Parker's Combination Pipe:
87 Series, 60%; 187 Series, 60&5%; No. 870, 40%.
Rock Island Pipe. 25%

Wads—*Price per M.*

B. E., 11 up. . . . . 60¢
B. E., 9 and 10. . . . . 70¢
B. E., 8. . . . . 80¢
B. E., 7. . . . . 80¢
P. E., 11 up. $1.00
P. E., 9 and 10. . . . . 1.25
P. E., 8. . . . . 1.50
P. E., 7. . . . . 1.50
Ely's B. E., 11 and larger. $1.70@1.75
Ely's P. E., 12 to 20. . . . $3.00@3.25

Dis. 15%

Ware, Hollow—Cast Iron, Hollow—

Store Hollow Ware:
Enameled . . . . . 45&10%
Ground . . . . . 50&5%
Plain or Unground. 60%
Country Hollow Ware, per 100 lbs . . . . . $2.75@$3.00
White Enameled Ware:
Maslin Kettles. . . . . 65&10%
Covered Wares:
Tinned and Turned. . . . . 35&10%
Enameled . . . . . 45&10%
See also *Pots, Glue.*

Enameled—

Agate Nickel Steel Ware. 33⅓%
El-an-ge . . . . . 60&10%
Iron Clad Ware. . . . . 70&10%
Lava and Volcanic, Enameled. . 40&10%

Tea Kettles—

Galvanized Tea Kettles:

Inch	*6*	*7*	*8*	*9*
Each	*45¢*	*50¢*	*55¢*	*65¢*

Steel Hollow Ware—

Avery Stamping Co.:
Never-Break Spiders and Griddles . . . . . 65&10%
Steel Kettles, Maslins Scotch Bowls, Tin'd. 60%
Steel Stew Pans, Stew Pots, etc., Porcelained 50%
Cleveland Stamping & Tool Co.:
Solid Steel Spiders and Griddles . . . . . 65&5%
Solid Steel Kettles. . . . . 60&5%

Warmers, Foot—

Pike Mfg. Co., Soapstone. . . . 40@40&10%

Washboards—

No.	₱ doz.
800—Brass King, Single Surface, Open Back	$2.80
862—White Hen, Spiral Grimp Glass	$5.35
964—Royal Blue Enamel, Single Surface, Ventilated Back	$3.35
172—Our Best, Single Zinc, Soap Drainer	$3.35
722—Soap Saver, Single Zinc, Iron Top	$3.35
100—Northern Queen, Single Zinc, Perforated, Open Back	$3.00
134—Universal, Single Zinc, Extra Family Size Ventilated Back	$2.80
760—Banner Globe, Single Zinc, Ventilated Back	$2.25
57—Peerless, Double Zinc, Spring Protector	$3.70
56—Red Cross, Double Zinc, Swing Protector	$3.60
17—North Star, Solid Zinc, Swing Protector	$3.60
797—Jewel, Single Zinc, Pail Size.	$1.25

Washers—Leather, Axle—

Solid . . . . . 90@90&10%
Patent . . . . . 90@90&5%
Coil:

⅞	1	1¼	1½	*inch.*
9¢	*10¢*	*11¢*	*14¢*	*per box.*

Iron or Steel—

Size bolt. . . . 5-16 ⅜ ½ ⅝ ¾
Washers. . . . $4.90 4.00 2.70 2.50 2.30

The above prices are based on $6.50 off list.

In lots less than one keg add ½¢ per lb.; 5-lb. boxes add ½¢ to list.

Avery Stamping Co.:
Standard, in 200 lb. kegs, $6.00 ₱ 100 lb. disct., in 100 lb. kegs add 10¢ net ₱ 100 lb; in 5 or 10 lb. boxes, add 50¢ net ₱ 100 lb.; in 1 lb. boxes, add $1.00 net ₱ 100 lb.

Cast Washers—

Over ½-inch, barrel lots, per lb. 1½@1¾¢

Wedges—

Oil Finish. . . . . lb., 2¼@2¾¢

Weights—Hitching—

Covert Mfg. Co. 30&2%

Sash—

Per net ton. . . . . $19.50@$21.00

Wheels, Corundum and Emery—

Pike Mfg. Co., Corundum, 65%
Emery 75%

Well—

8-in., $2.00; 10-in., $2.30; 12-in., $3.00; 14-in., $4.45.

Wire and Wire Goods—

Bright and Annealed:
6 to 9. . . . . 72½&10&7½%
10 to 18. . . . . 72½&10&10%
19 to 26. . . . . 75&10&10&2½%
27 to 36. . . . . 77½&6&7½%
Galvanized:
6 to 9. . . . . 72½&10%
10 to 14. . . . . 72½&10&5%
15 to 16. . . . . 72½&10&5%
17 to 18. . . . . 72½%
19 to 26. . . . . 70&5&2½%
27 to 36. . . . . 65&10&10%
Coppered:
6 to 9. . . . . 65&10&10%
10 to 14. . . . . 70&10&5%
15 to 18. . . . . 65&10&10&10%
19 to 26. . . . . 70&5&2½%
27 to 36. . . . . 72½&10&2½%
Tinned:
6 to 18. . . . . 67&10&10%
Brass . . . . . 16¼c lb., base
Copper . . . . . 15¼c lb., base
Cast Steel Wire. 50%

Spooled Wire—

Annealed and Tinned. 75@75&10%
Brass and Copper. . . . 70@70&10%
Retailers' Assortments, per box. $1.90@$2.10

Wire Clothes Line. See Lines.
Wire Picture Cord, see Cord.

Bright Wire Goods—

Steel Wire Goods. . . . . 90&10%
Brass Wire Goods. . . . . 90&10%
Brass Cup and Shoulder Hooks, 85%

Wire Cloth and Netting—

Galvanized Poultry Netting, 80&10@80&10&5%
Screen Cloth, 12 Mesh, Per 100 sq. ft.: Painted, $1.30; Galvanized, $1.90; 14 Mesh, Bronze $6.50
Standard Galv. Hardware Grade: 100 ft. rolls, 24 to 48 in. wide, Per 100 sq. ft.
Nos. 2, 2½ and 3 Mesh. . . . $2.75
Nos. 4 and 5 Mesh. $3.00
No. 6 Mesh. $3.25
Nos. 7 and 8 Mesh. $3.75

Wire, Barb—See *Trade Report*

Wrenches—

Agricultural . . . . . 80&5@80&10%
Alligator or Crocodile. . 70&10&5%
Baxter Pattern S Wrenches, 70&5@70&10%
Drop Forged S. . . . . 45@45&5%
Acme . . . . . 60&10%
Alligator Pattern, 70%; Bull Dog. . 70%
Bemis & Call's:
Adjustable S, 40&5%; Adjustable S Pipe, 40&5%; Briggs Pattern, 40%; Combination Bright, 50%.
Steel Handle Nut. . . . . 50&5%
Combination Black. . . . . 50&5%
Merrick Pattern. . . . . 50&5%
Boardman's 40%
Coes' Genuine Knife Hdl. . . 40&10&5&5%
Coes' Genuine Steel Hdl. . . 40&10&5&5%
Coes' Genuine Key Model. . 40&10&5&5%
Coes' Genuine Hammer Handle. . . . . 40&10&5&5%
Coes' "Mechanics'". . . 40&10&10&5&5%
Donohue's Engineer. . . . . 40&10%
Eagle 70%
Gem Pocket. 30%
Hercules 70%
W. & B. Machinist:
Case lots. . . . . 50&10%
Less than case lots. 50%
W. & B. Railroad Special:
Case lots. 50%
Less than case lots. . . . . 40&10&5%
Solid Handles, P., S. & W. . 50&10%
Full cases. . . . . 50&10&5%
Standard Nipple Mfg. Co.:
Duplex Chain. 50%
Uwanta Wrench Co.:
Uwanta Special, Iron Handle. . . . . 40&10&5%
Other Wrenches. 50%
Vulcan and Agrippa Chain. . . . 50%
Whitaker Machinists'. . . . . 50&10%
Wizard Adjustable Ratchet. 50%

Fruit Jar—

Benj. P. Forbes, Triumph, ₱ gro., $7.50; per doz. $0.90

Wrought Goods—

Staples, Hooks, &c., list March 17, '02. . . . . 90@—%

Zinc—(*Cask lots at mill.*)

Sheet. . . . . per 100 lb., $7.06

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:

1 to 1⅛ in. round and square; 1½ to 4 in. x ⅜ to 1 in.	₩ ℔ 1.90¢
1½ to 4 in. x ¼ to 5-16	₩ ℔ 2.10¢
Rods—⅜ and 11-16 round and square	₩ ℔ 2.10¢

Angles:

	Cts ₩ ℔
3 in. x ¼ in. and larger	2.25¢
3 in. x 3 16 in. and ⅛ in.	2.30¢
1½ to 2½ in. x ⅛ in.	2.10¢
1½ to 2¾ in. x 3-16 in. and thicker	2.05¢
1 to 1¼ in. x 3-16 in.	2.10¢
1 to 1¼ x ⅛ in.	2.15¢
⅝ x ⅛ in.	2.30¢
¾ x ⅛ in.	2.40¢
⅝ x ¼ in.	3.45¢
½ x 3-32 in.	3.55¢

Tees:

1 in.	2.40¢
1¼ in.	2.20¢
1½ to 2½ in.	2.10¢
3 in. and larger	2.35¢
Beams	2.25¢
Channels, 3 in. and larger	2.35¢
Bands—1½ to 6 x 3-16 to No. 8	2.25¢
"Burden's Best" Iron, base price	3.15¢
Burden's "H. B. & S." Iron, base price	2.95¢
Norway Bars	3.30¢

Merchant Steel from Store—

	per ℔
Bessemer Machinery	1.90¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black

	One Pass, C.R. Soft Steel.	R. G. Cleaned.
No. 16	₩ ℔ 2.60	3.00¢
Nos. 18 to 21	₩ ℔ 2.95	3.10¢
Nos. 22 and 24	₩ ℔ 3.00	3.45¢
No. 26	₩ ℔ 3.05	3.45¢
No. 28	₩ ℔ 3.20	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment, W. Deweeswood	₩ ℔ 11¾@14¼
Patent Planished	₩ ℔ A, 10¢; B, 9¢, net.

Galvanized.

Nos. 14 to 16	₩ ℔, 3.15¢
Nos. 22 to 24	₩ ℔, 3.55¢
No. 26	₩ ℔, 3.75¢
No. 28	₩ ℔, 4.25¢

No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—Galvanized.

Nos. 22 and 24	₩ ℔ .5 75¢
No. 26	₩ ℔ . 6.25¢
No. 28	₩ ℔ . 7 25¢

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:	
IC, 14 x 20	$6.40
IX, 14 x 20	7.65
A. Charcoal:	
IC, 14 x 20	$5.45
IX, 14 x 20	6.55

American Coke Plates—Bessemer-

IC, 14 x 20 ..... 107 ℔	$4.45
IX, 14 x 20	5.45

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating	$8 60
IX, 20 x 28 with an 8 lb. coating	10.60

Seamless Brass Tubes—

List December 4, 1905. Base price 19¢

Brass Tubes, Iron Pipe Sizes—

List December 4, 1905. Base price 19¢

Copper Tubes—

List December 4, 1905. Base price 23¢

Brazed Brass Tubes—

List August 1, 1908. 22½¢ ₩ ℔

High Brass Rods—

List August 1, 1908. 16¼¢ ₩ ℔

Roll and Sheet Brass—

List August 1, 1908. 16¢ ₩ ℔

METALS—

Tin—

Straits Pig ..... ₩ ℔ 32½@33 ¢

Copper—

Lake Ingot	₩ ℔ 15 @15¼¢
Electrolytic	₩ ℔ 14⅝@15 ¢
Casting	₩ ℔ 14⅛@14¾¢

Sheet Copper Hot Rolled, 16 oz	₩ ℔ 18 ..¢
" " " 14 "	" " 19 ..¢

Sheet Copper Cold Rolled, 1¢ ₩ ℔ advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ advance over Cold Rolled.
Sheet Copper Polished over 20 in. wide, 2¢ advance over Cold Rolled.
Bottoms, Pits and Flats ..... ₩ ℔ 21¢ basis
Planished Copper, 1¢ ₩ ℔ more than Polished.

Spelter—

Western ..... ₩ ℔ 5¾@6¢

Zinc.

No 9, base, casks, ₩ ℔ 7.50¢ | Open ..... ₩ ℔ 8.00¢

Lead.

American Pig	₩ ℔ 5 @4¾¢
Bar	₩ ℔ 6 @5¾¢

Solder.

½ & ½, guaranteed	₩ ℔ 20½@21 ¢
No. 1	₩ ℔ 18 @18¼¢
Refined	₩ ℔ 15¾@16 ¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson	₩ ℔ ..@10¢
Hallett's	@9½¢
Other Brands	@9 ¢

Bismuth—

Per. ℔ $1.90@$2.00

Aluminum—

No 1 Aluminum (guaranteed over 99% pure), in ingot for remelting:

Small lots	24¢
Rods & Wire	Base Price 33¢
Sheets	Base Price 34¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	—Cents—
Copper, Heavy and Wire	₩ ℔ 10.75@11.00¢
Copper, Light and Bottoms	₩ ℔ 10.00@10.25¢
Brass, Heavy	₩ ℔ 7.75@ 8.00¢
Heavy Machine Composition	₩ ℔ 10 25@10.50¢
Clean Brass Turnings	₩ ℔ 7.75@ 8.00¢
Composition Turnings	₩ ℔ 8.00@ 8.25¢
Lead, Heavy	₩ ℔ ....@ 3.50¢
Tea Lead	₩ ℔ ....@ 3.25¢
Zinc Scrap	₩ ℔ ....@ 3.00¢

THE IRON AGE

The oldest paper in the world devoted to the interests of the Hardware, Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.

ISSUED EVERY THURSDAY MORNING.

Subscription, postpaid, $5 00 a year.

TWO DOLLAR EDITION, $2.00 a year; DOLLAR EDITION, $1.00 a year, to the United States, Mexico, Hawaii Cuba, Philippine Islands. OTHER COUNTRIES: Weekly Edition $7.50; Semi-monthly Edition, $4.00; Monthly Edition, $2.50.

ADVERTISING RATES ON APPLICATION.

New York (Main Office)	14-16 Park Place,	DAVID WILLIAMS CO., Pub.
Philadelphia,	Real Estate Trust Co. Bldg., Broad and Chestnut Sts.	S. S. RECKEFUS, Manager.
Pittsburgh,	Park Building, 357 Fifth Avenue,	ROBERT A. WALKER, Manager.
Chicago,	Fisher Building, Dearborn and Van Buren Streets.	A. A. AINSWORTH, Manager.
Cincinnati,	Pickering Building, Fifth and Main Streets,	HENRY SMITH, Manager.
Boston,	Compton Building, 161 Devonshire Street,	WALTER C. ENGLISH, Manager.
Cleveland,	The Cuyahoga, 311 Superior Street,	EZRA S. ADAMS, Manager.

Remittances should be made by Draft, payable to the order of DAVID WILLIAMS COMPANY on any banking house in the United States or Europe, or by Post Office, Bank or Express Money Order on New York When those cannot be obtained, postage stamps of any country will be received.

Newsdealers or Booksellers in any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A. The International News Company, New York, U. S. A. and London England; or the San Francisco News Company, San Francisco, Cal. U. S. A.

ENTERED AT THE POST OFFICE, NEW YORK, AS SECOND CLASS MATTER